



Aerospace Medicine  
and Biology  
A Continuing  
Bibliography  
with Indexes

NASA SP-7011(244)  
April 1983



National Aeronautics and  
Space Administration

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# **AEROSPACE MEDICINE AND BIOLOGY**

## **A CONTINUING BIBLIOGRAPHY WITH INDEXES**

**(Supplement 244)**

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in March 1983 in

- *Scientific and Technical Aerospace Reports (STAR)*
- *International Aerospace Abstracts (IAA).*



Scientific and Technical Information Branch

**National Aeronautics and Space Administration**

Washington, DC

**1983**

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# INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* lists 286 reports, articles and other documents announced during March 1983 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the Earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the bibliography consists of a bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged by *STAR* categories 51 through 55, the Life Sciences division. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* or *STAR*, including the original accession numbers from the respective announcement journals. The *IAA* items will precede the *STAR* items within each category.

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An annual index will be prepared at the end of the calendar year covering all documents listed in the 1983 Supplements.

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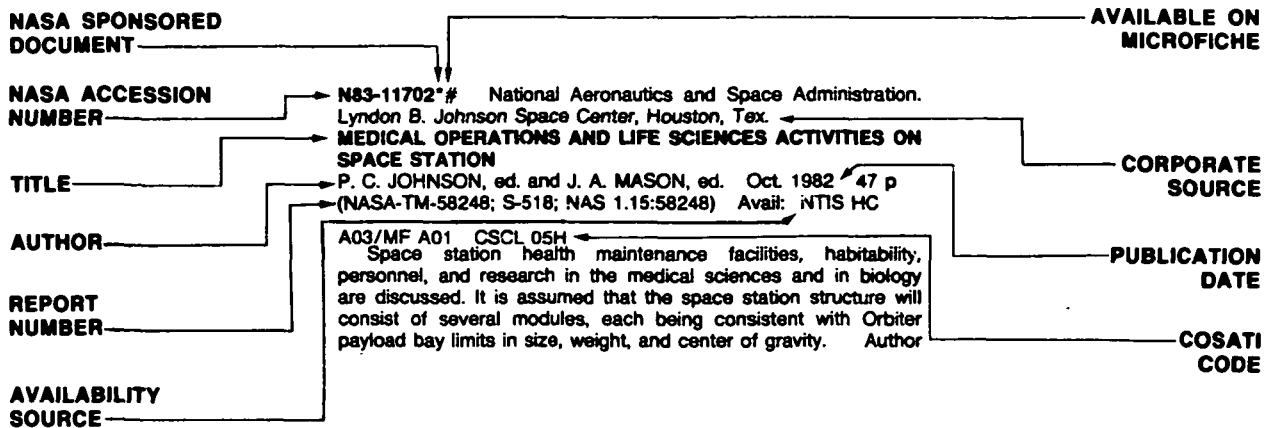
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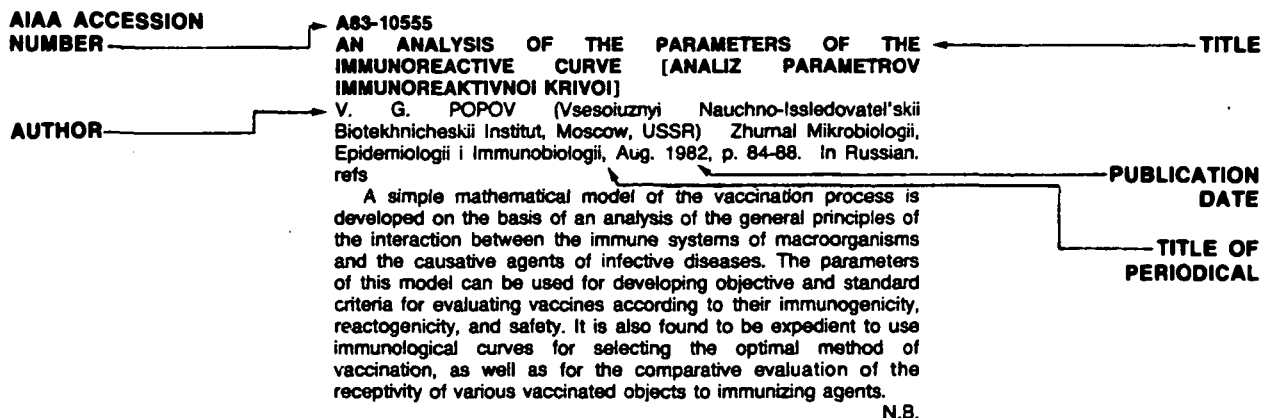
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# AEROSPACE MEDICINE AND BIOLOGY

*A Continuing Bibliography (Suppl. 244)*

APRIL 1983

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## LIFE SCIENCES (GENERAL)

Includes genetics.

A83-16940

### THE OPIOID PEPTIDE DYNORPHIN, CIRCADIAN RHYTHMS, AND STARVATION

R. PRZEWLOCKI, W. LASON (Polska Akademia Nauk, Instytut Farmakologii, Krakow, Poland), A. M. KONECKA (Polish Academy of Sciences, Institute of Genetics and Animal Breeding, Jastrzebiec, Poland), C. GRAMSCH, A. HERZ (Max-Planck-Institut fuer Psychiatrie, Munich, West Germany), and L. D. REID (Rensselaer Polytechnic Institute, Troy, NY) *Science*, vol. 219, Jan. 7, 1983, p. 71-73. refs

Dynorphin, an opioid peptide whose functions are unknown, is found in brain, pituitary, and peripheral organs. Specific radioimmunoassays were used to measure dynorphin in the hypothalamus and pituitary, during the day and at night, as a function of food and water deprivation. Immunoreactive dynorphin was increased in the hypothalamus and decreased in the pituitary at night. Water deprivation led to more than 50 percent reduction in daytime levels of pituitary dynorphin and concomitant increases in hypothalamic dynorphin. (Author)

A83-17111

### BIOTECHNOLOGY IN SPACE LABORATORIES

A. COGOLI and A. TSCHOPP (Zuerich, Eidgenoessische Technische Hochschule, Zurich, Switzerland) In: *Space and terrestrial biotechnology*. Berlin, Springer-Verlag 1982, 1982, p. 1-50. Swiss National Science Foundation refs (Contract SNSF-3,449,079)

A review concerning the technological and scientific aspects of the biological experiments performed during U.S. and USSR space missions is presented. Also, the biological experiments planned for Spacelab missions are examined, and practical information is given on the requirements of flight hardware and on the limits in weight, energy, and crew-time. Topics discussed include the biological payloads on U.S. missions, such as biostack experiments, the tissue culture incubator on Skylab, the separation of cells by electrophoresis, and the Viking mission to Mars, as well as the bioprocessing of mammalian cells in space, and high-g and low-g ground simulations. Extensive tables are presented which list the biological payloads of U.S. and USSR missions, and also the planned biological experiments for the first Spacelab mission. In addition, schematic diagrams depicting several of the biological experiments are included. N.B.

A83-17122

### THE CYTOKINETICS AND MORPHOLOGY OF HEMOPOIESIS DURING CHRONIC IRRADIATION [TSITOKINETIKA I

### MORFOLOGIIA KROVETVORENIIA PRI KHRONICHESKOM OBLUCHENII]

A. V. ILIUKHIN, V. S. SHASHKOV, T. E. BURKOVSKAIA, and E. S. ZUBENKOVA Moscow, Energoizdat, 1982. 136 p. In Russian. refs

Results are presented for an investigation of the cytokinetic and morphological parameters of the damages to the blood system of dogs and its recovery during chronic irradiation in doses of 0.21, 0.62, and 1.25 gram Roentgens/year and chronic irradiation for various periods at total yearly doses of 1.90 gram Roentgens. The study was conducted for three years of uninterrupted irradiation of the experimental animals and for one year following the termination of the radiation exposure. Two different methods for evaluating the changes in the experimental animals, functional (cytokinetic) and morphological methods, were used in order to increase the reliability of the results, as well as to provide information about various cellular mechanisms during the development of chronic radiation pathology. N.B.

A83-17153

### THE PHYSIOLOGICAL MECHANISMS RESPONSIBLE FOR AN INCREASE IN MUSCULAR EFFICIENCY UNDER LOCAL DECOMPRESSION [O FIZIOLOGICHESKIKH MEKHAZIMAKH POVYSHENIIA MYSHECHNOI RABOTOSPOSOBNOSTI POD VLIAMIEM LOKAL'NOI DEKOMPRESSIONI]

M. L. IAKUSHEVA, I. M. RODIONOV, L. A. IOFFE, IU. L. KISLITSYN, and D. L. DLIGACH (Moskovskii Gosudarstvennyi Universitet; Gosudarstvennyi Tsentral'nyi Institut Fizicheskoi Kul'tury; Universitet Druzhby Narodov, Vsesoiuznyi Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury, Moscow, USSR) *Teoriia i Praktika Fizicheskoi Kul'tury*, Oct. 1982, p. 17-19. In Russian. refs

The paper reports the results of a series of experiments which have been conducted on frogs in order to investigate the mechanisms underlying the local negative pressure effect, i.e., an increase in muscular efficiency resulting from local decompression. It is shown that the experimental data support the hypothesis that the mechanism of this effect is associated with the role of a certain macromolecular compound contained in the blood which is capable of entering the intercellular liquid and affecting the tissue metabolism only during the expansion of the capillary pores. The practical implications of this conclusion are briefly examined. V.L.

A83-17161

### ADAPTATION AND RESISTANCE TO HYPOXIA IN LIGHT OF THE FUNCTIONAL ACTIVITY OF THE ANTISYSTEMS [ADAPTATSIIA I RESISTENTNOST' K GIPOKSII V SVETE FUNKTSIONAL'NOI AKTIVNOSTI ANTISISTEM]

V. T. ANTONENKO (Kievskii Institut Usovershenstvovaniia Vrachei, Kiev, Ukrainian SSR) *Vrachebnoe Delo*, Aug. 1982, p. 69-73. In Russian. refs

The roles and functions of systems and antisystems, such as enzymes and their inhibitors, are discussed, with an emphasis on both the forward and reverse (feedback) mechanisms which participate in the adaptation and resistance to hypoxia. The results of experiments are presented which show that the time of



## 51 LIFE SCIENCES (GENERAL)

adaptation to hypoxia can be greatly lengthened by increasing the amount of certain low-molecular weight compounds. It is proposed that antisystems are crucial to limiting the adaptation of organisms to the conditions of hypoxia, and that heparin plays a leading role in this process. In addition, the system-antisystem interrelations in the homeostatic regulation of the function of the lymph tissues and their role in the adaptation to hypoxia are also examined. N.B.

**A83-17164**

**THE EFFECT OF AN ELECTRIC FIELD OF INDUSTRIAL FREQUENCY ON PARAMETERS OF NATURAL IMMUNITY [DEISTVIE ELEKTRICHESKOGO POLIA PROMYSHLENNOI CHASTOTY NA POKAZATELI ESTESTVENNOGO IMMUNITETA]**

S. A. LIUBCHENKO (Kievskii Nauchno-Issledovatel'skii Institut Obshchei i Kommunal'noi Gigieny, Kiev, Ukrainian SSR) Vrachebnoe Delo, Aug. 1982, p. 103-105. In Russian. refs

**A83-17165**

**THE MORPHOLOGICAL CHANGES OF NEURONS OF THE CENTRAL NERVOUS SYSTEM DURING THE EXPERIMENTAL ACTION ON THE BODY OF ELECTROMAGNETIC WAVES IN THE CENTIMETER RANGE [MORFOLOGICHESKIE IZMENENIYA NEIRONOV TSENTRAL'NOI NERVNOI SISTEMY PRI EKSPERIMENTAL'NOM VOZDEISTVII NA ORGANIZM ELEKTROMAGNITNYKH VOLN SANTIMETROVOGO DIAPAZONA]**

V. S. BELOKRITSKII (Kievskii Nauchno-Issledovatel'skii Institut Obshchei i Kommunal'noi Gigieny, Kiev, Ukrainian SSR) Vrachebnoe Delo, Aug. 1982, p. 105-109. In Russian. refs

**A83-17166**

**THE CONDITION OF THE METABOLISM OF THE BRAIN AND LIVER DURING THE EXPERIMENTAL APPLICATION OF A MICROWAVE FIELD OF NONTHERMAL INTENSITIES [SOSTOYANIE METABOLIZMA GOLOVNOGO MOZGA I PECHENI PRI EKSPERIMENTAL'NOM VOZDEISTVII SVCH-POLIA NETEPLOVYKH INTENSIVNOSTEI]**

V. S. BELOKRITSKII and L. A. TOMASHEVSKAIA (Kievskii Nauchno-Issledovatel'skii Institut Obshchei i Kommunal'noi Gigieny, Kiev, Ukrainian SSR) Vrachebnoe Delo, Oct. 1982, p. 115-118. In Russian.

The effects of small doses of a nonthermal microwave field (50 microwatts/sq cm for 6 hr), repeated 10 times, on histochemical and biochemical parameters of the brain and liver of white rats are investigated. Also studied are the resistance of the animals following irradiation to hypoxia and to a single larger dose of radiation. Results show that the radiation exposures change the structural-functional basis of the mechanisms of the regulation of oxidative processes, disconnects oxidative phosphorylation, and causes compensatory increases in glycolysis and in the synthesis of enzymes. In addition, it is found that exposures to small doses of radiation increase the resistance of the animals to conditions of hypoxia. N.B.

**A83-17174**

**HISTOCHEMICAL CHANGES IN MUSCLES AND LIVER DURING PHYSICAL LOADS AND OVERHEATING /EXPERIMENTAL INVESTIGATION/ [GISTOKHIMICHESKIE IZMENENIYA V MYSHTSAKH I PECHENI PRI FIZICHESKOI NAGRUZKE I PEREGREVANII /EKSPERIMENTAL'NOE ISSLEDOVANIE/]**

K. P. LEVCHENKO and A. I. ZHURAVLEVA (Tsentral'nyi Institut Vsovershenstvovaniia Vrachei, Moscow, USSR) Voprosy Kurologii, Fizioterapii i Lechebnoi Fizicheskoi Kul'tury, Sept.-Oct. 1982, p. 11-14. In Russian. refs

The effect of exercise and high ambient temperature on the histochemistry of the muscles and liver are studied in rats in order to gain a better idea of the value of saunas and similar heat treatments as part of regimes of physical therapy. Among other results, it was found that overheating leads to changes analogous to those caused by exercise, such as disappearance of the cross-band striations of the muscle fibers, edema of the muscle

fibers, and a decrease in the amount of glycogen in the muscles. Overheating leads to a replacement of glycogen in the liver by neutral fats, while exercise leads to moderate levels of fatty and granular dystrophy and a decrease in the glycogen content of the liver. In both the muscles and the liver, overheating 3-4 hr after exercise leads to a more pronounced effect than either exercise or overheating alone. N.B.

**A83-17182**

**THE FUNCTIONAL CHARACTERISTICS OF THE IMMUNE RESPONSE STIMULATORS CIRCULATING IN THE BLOOD IN A TOXIC AFFECTION OF THE LIVER [FUNKSIONAL'NAIA KHARAKTERISTIKA STIMULATOROV IMMUNOGO OTVETA, TSIRKULIRUIUSHCHIKH V KROVI PRI TOKSICHESKOM PORAZHENII PECHENI]**

A. I. KONOPLIA (Kurskii Meditsinskii Institut, Kursk, USSR) Patologicheskaiia Fiziologiia i Eksperimental'naia Terapiia, Sept.-Oct. 1982, p. 23-28. In Russian. refs

**A83-17183**

**THE ROLE OF THE LUNG IN THE FORMATION OF THE RHEOLOGICAL PROPERTIES OF THE BLOOD [ROL' LEGKOGO V STANOVLENI REOLOGICHESKIKH SVOISTU KROVI]**

O. V. ALEKSANDROV, V. N. RAIBMAN, and V. L. GRISHIN (II Moskovskii Meditsinskii Institut Moscow, USSR) Patologicheskaiia Fiziologiia i Eksperimental'naia Terapiia, Sept.-Oct. 1982, p. 17-20. In Russian. refs

**A83-17184**

**THE POSTSTRESS ACTIVATION OF THE SYNTHESIS OF NUCLEIC ACIDS AND PROTEINS AND ITS ROLE IN THE ADAPTIVE REACTIONS OF THE ORGANISM [POSTSTRESSORNAIA AKTIVATSIIA SINTEZA NUKLEINOVYKH KISLOT I BELKOV I EE ROL' V ADAPTATSIONNYKH REAKTSIIAKH ORGANIZMA]**

F. Z. MEERSON, V. I. PAVLOVA, G. T. SUKHIKH, M. G. PSHENNIKOVA, G. P. EFIMENKO, V. V. SOLOMATIN, B. A. FROLOV, and E. IA. VORONTSOVA (Akademii Meditsinskikh Nauk SSSR, Moscow; Cheliabinskii Gosudarstvennyi Pedagogicheskii Institut, Chelyabinsk; Orenburgskii Meditsinskii Institut, Orenburg, USSR) Patologicheskaiia Fiziologiia i Eksperimental'naia Terapiia, Sept.-Oct. 1982, p. 3-14. In Russian. refs

The role of the stress syndrome in the formation of systemic structural traces and stable, long-term adaptation is investigated in experiments with white rats. The decrease in the content of nucleic acids and proteins is quantitatively determined in the initial (catabolic) phase of acute emotional stress, and the generalized poststress activation of the synthesis of nucleic acids and proteins (the anabolic phase of the stress reaction) is evaluated. Also, the penetrating effects of the anabolic phase of the nonspecific stress reaction on the formation of some varied specific adaptive reactions of the organism, such as the primary immune response and the defensive conditioned reflex, are demonstrated. It is concluded that the activation of the synthesis of nucleic acids and proteins following the exposure to stressful conditions can potentiate the formation of long-term specialized adaptive reactions of the organism to specific factors. N.B.

**A83-17185**

**THE EFFECT OF MECHANICAL ASPHYXIS ON LIPID PEROXIDATION PROCESSES IN THE RAT BRAIN [VLIANIE MEKHANICHESKOI ASFIKSII NA PROTSESSY PEREKISNOGO OKISLENIIA LIPIDOV V GOLOVNOM MOZGE KRYSA]**

V. D. KONVAI (Omskii Meditsinskii Institut, Omsk, USSR) Patologicheskaiia Fiziologiia i Eksperimental'naia Terapiia, Sept.-Oct. 1982, p. 30-32. In Russian. refs

A83-17186

**THE IMPROVEMENT OF THE MYOCARDIAL RESISTANCE TO PITUITRIN VIA ADAPTATION TO HYPOXIA [POVYSHENIE RESISTENTNOSTI MIOKARDA K PITUITRINOVOMU POVREZHDENIU PUTEM ADAPTATSII K GIPOKSII]**

E. E. ZVERKOVA (Akademiia Nauk Kazakhskoi SSR, Institut Fiziologii, Alma-Ata, Kazakh SSR) Patologicheskaiia Fiziologiia i Eksperimental'naia Terapiia, Sept.-Oct. 1982, p. 42-44. In Russian. refs

It is known that previous conditioning to hypoxia together with the improvement of the general resistance capability of the organism prevent or minimize disturbances of the functions of the myocardium under extreme conditions and in experimental myocardial infarction, and promote a favorable outcome in the case of acute coronary insufficiency which occurs in connection with the administration of pituitrin. The present investigation provides data regarding the improvement of the myocardial resistance to pituitrin-produced ischemia after 30 days of conditioning to hypoxia and hypoxia-hypercapnia. The results of studies conducted with 120 male rats show that a conditioning for a period of 30 days involving gradually increasing level of hypoxia in conjunction with hypercapnia increases the myocardial resistance to acute ischemia produced by an administration of pituitrin. A corresponding conditioning procedure with respect to hypoxia alone has a somewhat smaller effect in the same direction. G.R.

A83-17187

**THE EFFECT OF XENOGENOUS CEREBROSPINAL FLUID ON THE COURSE OF EXPERIMENTAL HYPERCHOLESTEROLEMIA [VLIANIE KSENOGENNOI SPINNOMOZGOVOI ZHIDKOSTI NA TECHENIE EKSPERIMENTAL'NOI GIPERKHOLESTERINEMII]**

A. I. PERTSOVSKII, N. S. KONONOVA, and I. V. ZADNIPRIANNYI (Nauchno-Issledovatel'skii Institut Fizicheskikh Metodov Lecheniia i Meditsinskoi Klimatologii, Yalta, Ukrainian SSR) Patologicheskaiia Fiziologiia i Eksperimental'naia Terapiia, Sept.-Oct. 1982, p. 60-62. In Russian. refs

A83-17188

**THE SURFACTANT SYSTEM OF THE LUNGS IN EXPERIMENTAL PAPAIN-INDUCED EMPHYSEMA [SURFAKTANTNAIA SISTEMA LEGKIKH PRI EKSPERIMENTAL'NOI PAPAINOVOI EMFIZEME]**

I. A. SEREBROVSKAIA, V. V. SHISHKANOV, and M. T. AITKULOV (Karagandinskii Meditsinskii Institut, Karaganda, Kazakh SSR) Patologicheskaiia Fiziologiia i Eksperimental'naia Terapiia, Sept.-Oct. 1982, p. 63, 64. In Russian. refs

A83-17189

**THE STRUCTURE OF THE SLEEP-WAKEFULNESS CYCLE GIVEN AN EXPERIMENTAL INSUFFICIENCY OF CEREBRAL CIRCULATION [STRUKTURA TSIKLA SON-BODRSTVOVANIE PRI EKSPERIMENTAL'NOI NEDOSTATOCHNOSTI MOZGOVOGO KROVOOBRAZHENIIA]**

P. V. VOLOSHIN, D. A. ROMANOV, A. IA. MOGILEVSKII, I. A. METIBOVSKII, and I. V. RUBETS (Ministerstvo Zdravookhraneniia Ukrainskoi SSR, Nauchno-Issledovatel'skii Institut Nevrologii i Psikiatrii, Kharkov, Ukrainian SSR) Patologicheskaiia Fiziologiia i Eksperimental'naia Terapiia, Sept.-Oct. 1982, p. 69-71. In Russian. refs

A83-17190

**THE AUTOALLERGIC EFFECT OF MICROWAVES AND THEIR INFLUENCE ON FETUS AND OFFSPRING [AUTOALLERGICHESKIE EFFEKTY VOZDEISTVIA ELEKTROMAGNITNOI ENERGII SVCH-DIAPAZONA I IKH VLIANIE NA PLOD I POTOMSTVO]**

M. G. SHANDALA and G. I. VINOGRADOV (Kievskii Nauchno-Issledovatel'skii Institut Obshchei i Kommunal'noi Gigieny, Kiev, Ukrainian SSR) Akademiia Meditsinskikh Nauk SSSR, Vestnik, no. 10, 1982, p. 13-16. In Russian. refs

A83-17192

**A HISTOCHEMICAL STUDY OF THE RAT SPINAL CORD, SPINAL GANGLIA, AND ADRENAL GLANDS UNDER LOCAL VIBRATION [GISTOKHIMICHESKOE IZUCHENIE SPINNOGO MOZGA, SPINAL'NYKH GANGLIEV I NADPOCHECHNIKOV KRYV V USLOVIKAKH VOZDEISTVIA LOKAL'NOI VIBRATSII]**

I. M. SHNAIDMAN and A. P. FILIN (Karagandinskii Meditsinskii Institut, Karaganda, Kazakh SSR) Gigiena Truda i Professional'nye Zabolovaniia, Oct. 1982, p. 46-48. In Russian. refs

A83-17196

**GROWTH AND AGING OF THE LENS [ROST I STARENIE KHRUSTALIKI]**

N. I. USOV (Odesskii Nauchno-Issledovatel'skii Institut Glaznykh Boleznei i Tkanevoi Terapii, Odessa, Ukrainian SSR) Oftal'mologicheskii Zhurnal, vol. 37, no. 6, 1982, p. 362-365. In Russian.

The growth dynamics of the lens was investigated in 511 rabbits from the first day of life to an age of five years. Changes in lenticular mass, the area of the monolayer of anterior capsule epithelial cells, the density of cells per unit of cell area, and mitotic activity were studied. It is shown that the production of new cells is high in new-born rabbits and takes place along the entire area of the anterior capsule monolayer. With age, the zone of dividing cells is restricted by peripheral portions of the monolayer, and the number of dividing cells experiences a 35-fold decrease by the age of five years as compared with new-born rabbits. Lens weight tends to increase to an age of two-to-three years, but then a tendency of weight decrease is observed. B.J.

A83-17202

**THE GENETIC DANGER OF MICROWAVES OF NONTHERMAL INTENSITY AND ITS HYGIENIC ASPECTS [GENETICHESKAIA OPASNOST' MIKRODIOVOLN NETEPLOVOI INTENSIVNOSTI I EE GIGIENICHESKIE ASPEKTY]**

M. G. SHANDALA, E. N. ANTIPENKO, I. V. KOVESHNIKOVA, and O. I. TIMCHENKO (Kievskii Nauchno-Issledovatel'skii Institut Oshchei i Kommunal'noi Gigieny, Kiev, Ukrainian SSR) Gigiena i Sanitariia, Oct. 1982, p. 38-41. In Russian. refs

Rats were exposed to electromagnetic radiation at a frequency of 2375 MHz and an energy flux density of 10 microwatts/sq cm over a period of 45 days for seven hours daily. It is shown that this exposure resulted in a marked antimutagenic effect in the liver cells, associated with enhanced chromosomal sensitivity to subsequent X-ray irradiation. Following irradiation at an energy flux density of 50 microwatts/sq cm, a mutagenic effect was observed in some of the rats. The data tend to support the existence of minimum, optimal, and maximum allowable levels for the manifestation of the factor investigated, as well as the possibility of determining these levels. B.J.

A83-17204

**MICROBIOCHEMICAL CRITERIA FOR ADAPTIVE REACTIONS IN CERTAIN BARRIER SYSTEMS OF THE ORGANISM [MIKROBIOKHIMICHESKIE KRITERII PRISPOBITEL'NYKH REAKTSII V NEKOTORYKH BAR'ERNYKH SISTEMAKH ORGANIZMA]**

T. I. BONASHEVSKAIA, R. V. MERKUREVA, I. S. SHATERNIKOVA, N. B. KUMPAN, T. G. GASANOV, S. I. DOLINSKAIA, L. F. ASTAKHOVA, L. I. BUSHINSKAIA, and Z. M. GASIMOVA (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR; Ministerstvo Zdravookhraneniia Azerbaidzhanskoi SSR, Nauchno-Issledovatel'skii Institut Virusologii, Mikrobiologii i Gigieny, Baku, Azerbaidzhan SSR) Gigiena i Sanitariia, Oct. 1982, p. 21-24. In Russian. refs

The present investigation is concerned with the mechanisms utilized in adaptive processes of the organism, taking into account morphofunctional and biochemical criteria for adaptive reactions in important barrier systems. Experiments with white rats were conducted. The experiments involved the inhalation of polluted air by the animals for 5, 30, or 60 days. The air contained 1,2-dichloropropane in a concentration of 10 mg/cu m. The barrier systems studied include the liver and the lungs, which represent

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basic barrier systems of the organism in connection with the inhalation of toxic substances. Histochemical and morphological studies were conducted along with an investigation involving the utilization of an electron microscope, biochemical methods, and a graphical procedure. It was found that there are cellular changes which lead to a decreased resistance of the organism. Pathological disturbances develop both on the cellular level and on the level of the biological organization of the organism. Comprehensive morphofunctional and biochemical studies make it possible to identify the involved mechanisms. G.R.

### A83-17207

#### STROMAL BONE-MARROW CELLS AND THE HEMOPOIETIC ENVIRONMENT [STROMAL'NYE KLETKI KOSTNOGO MOZGA I KROVETVORNOM MİKROOKRUZHENIE]

A. IA. FRIDENSHTEIN (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Arkhiv Patologii, vol. 44, no. 10, 1982, p. 3-11. In Russian. refs

### A83-17211

#### AN EXPERIMENTAL STUDY OF THE POSSIBILITY OF USING A CO<sub>2</sub> LASER FOR CHANGING THE CORNEA REFRACTION /A PRELIMINARY REPORT/ [IZUCHENIE VOZMOZHNOСТИ PRIMENENIIA CO<sub>2</sub>-LAZERA DLIIA IZMENENIIA REFRAKTSII ROGOVOI OBOLOCHKI GLAZA V EKSPERIMENTE /PREDVARITEL'NOE SOOBSHCHENIE/]

S. E. AVETISOV, V. S. AKOPIAN, A. V. BOLSHUNOV, A. P. CHETVERUKHIN, and M. M. KRASNOV (Ministerstvo Zdravookhraneniia SSSR, Vsesoiuznyi Nauchno-Issledovatel'skii Institut Glaznykh Boleznei, Moscow, USSR) Vestnik Oftal'mologii, Sept.-Oct. 1982, p. 32-36. In Russian. refs

### A83-17214

#### PECULIARITIES OF THE FORMATION OF THE SEX ORGANS OF ARABIDOPSIS THALIANA /L./ HEYNH UNDER CONDITIONS OF SPACE FLIGHT [OSOBIVOSTI FORMUVANNIA GENERATIVNIKH ORGANIV ARABIDOPSIS THALIANA /L./ HEYKH V UM OVAKH KOSMICHNOGO POL'OTU]

E. L. KORDIUM and I. I. CHERNIAEVA (Akademiia Nauk Ukrain'skoi RSR, Institut Botaniki, Kiev, Ukrainian SSR) Akademiia Nauk Ukrain'skoi RSR, Dopovidi, Seriya B - Geologichni, Khimichni ta Biologichni Nauki, Aug. 1982, p. 67-70. In Ukrainian. refs

The paper examines the formation of the androecium and gynaecium elements in Arabidopsis plants grown from the stages of two cotyledonous leaves in the Svetoblok-1 device on the Salyut 6 space station and in a ground-based laboratory. It is shown that flower buds and flowers normally formed in habitus, contain sterile androecium and gynaecium elements whose degeneration occurs at different stages of the development of Arabidopsis plants under conditions of weightlessness. B.J.

### A83-17217

#### THE POSITIVE EFFECT THAT REDUCED VENOUS RETURN HAS ON BLOOD CIRCULATION IN CASES OF MYOCARDIAL INFARCTION [O POLOZHITEL'NOM DEISTVII REDUTSIROVANNOGO VENOZNOGO VOZVRATA NA KROVOOBRASHCHENIE PRI INFARKTE MIOKARDA]

IU. V. BELOV (Kuibyshevskii Meditsinskii Institut, Kuibyshev, USSR) Kardiologiya, vol. 22, Oct. 1982, p. 87-91. refs

The investigation is carried out on adult dogs weighing between 10 and 22 kg. The goal is to assess the effect of reduced venous return on the hemodynamics and functioning of heart ventricles in cases of acute myocardial infarction. It is found that placing a ligature high on the front interventricular coronary artery is accompanied by a reduction in the activity of the left ventricle, with the right ventricle continuing to function normally. Differences in hemodynamic regime, contractility, and phase structure of the ventricles when the ligature is in place are reflected in the dynamics of pulmonary circulation; they lead to an increase in the blood volume in the lungs. Reducing these differences acts to reduce the congestion in pulmonary circulation. C.R.

### A83-17219

#### MORPHOLOGICAL AND FUNCTIONAL PECULIARITIES OF THE MYOCARDIUM DURING EXTREME CORONARY INSUFFICIENCY [MORFOFUNKSIONAL'NYE OSOBENNOSTI MIOKARDA PRI EKSTREMAL'NOI KORONARNOI NEDOSTATOCHNOSTI]

A. S. GAVRISH (Ukrainskii Nauchno-Issledovatel'skii Institut Kardiologii, Kiev, Ukrainian SSR) Kardiologiya, vol. 22, Oct. 1982, p. 65-67. In Russian. refs

### A83-17220

#### THE EFFECT OF DOPAMINE ON CORONARY CIRCULATION [VLIANIE DOPAMINA NA KORONARNOE KROVOOBRASHCHENIE]

N. N. KIPSHIDZE, A. P. NESHCHERET, and A. I. KHOMAZIUK (Ministerstvo Zdravookhraneniia Gruzinskoi SSR, NII Eksperimental'noi i Klinicheskoi Terapii, Tbilisi, Georgian SSR; Kievskii Nauchno-Issledovatel'skii Institut Endokrinologii i Obmena Veshchestv, Kiev, Ukrainian SSR) Kardiologiya, vol. 22, Oct. 1982, p. 60-65. In Russian. refs

The effect of dopamine on coronary and systemic circulation was investigated in dogs. The bypassing branch of the left coronary artery was catheterized and extracorporeally perfused, and the vascular resistance of the heart, as well as the cardiodynamic and hemodynamic patterns, were recorded simultaneously. Results show that dopamine introduced into the coronary perfusion flow causes a dilation of the coronary vessels, a drop in the arterial blood pressure, a dilation of the peripheral vessels, and changes in the heart rate and the intensity of cardiac contractions. It is found that the coronary vessels are dilated in two steps, and are the result of cholinergic activation and the direct stimulation of beta-adrenoreactive systems. The two steps can be blocked by atropine and obsidan, respectively. Only a slight coronary vasoconstriction is produced by dopamine following the blocking of the m-cholinergic and beta-adrenoreactive systems. N.B.

### A83-17307#

#### THE ROLE OF SIMULATION IN GENERAL AVIATION

R. FRASCA (Frasca International, Inc., Champaign, IL) In: Radio Technical Commission for Aeronautics, Technical Symposium and Annual Assembly Meeting, Washington, DC, November 18-20, 1981, Proceedings. Washington, DC, Radio Technical Commission for Aeronautics, 1982, p. 85-91.

The present FAA approvals of ground instrument trainers under FAR Parts 61, 141, and 135 are reviewed. Estimating 12 to 20 hours for solo, the average time for the Private Pilot Rating is 50 hours. It is pointed out that in many cases, this is marginal. It is felt to be most important that the simulator be used quite heavily in the presolo stage. Research concerning a new private pilot training program is discussed. First-phase studies are now being projected to develop additional training programs. The second phase will automatically qualify trainees for instrument ratings. A coordinated program, Private Pilot to Instrument Rating, resulted in seven of eight students completing their instrument courses in record time. Plans for establishing a model flight training school are discussed. It is planned to start with novice students and to have them well qualified for the air system with 75 hours of aircraft and 35 to 50 hours of ground trainer. G.R.

### A83-17326

#### MODELS FOR A COMPARATIVE FUNCTIONAL ANALYSIS OF GAS EXCHANGE ORGANS IN VERTEBRATES

J. PIIPER and P. SCHEID (Max-Planck-Institut fuer experimentelle Medizin, Goettingen, West Germany) (International Satellite Symposium on Comparative Physiology of Respiration, Ohio State University, Columbus, OH, Oct. 11, 12, 1981.) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology, vol. 53, Dec. 1982, p. 1321-1329. refs

The analysis of external gas exchange in the various respiratory organs of vertebrates is based on models with gas transport properties determined by ventilatory, diffusive, and perfusive conductances and by the geometric arrangement of medium and blood flows. The following factors are examined: water vs. air as

external medium; gas transport properties of blood; diffusive gas transfer between medium and blood; problems in assessing diffusion limitation in fish gills, amphibian skin, avian lungs, and mammalian lungs. Finally the limitations to the analysis imposed by various physiological and anatomical complexities are discussed. (Author)

#### A83-17327

##### COMPARATIVE BRAIN OXYGENATION AND MITOCHONDRIAL REDOX ACTIVITY IN TURTLES AND RATS

T. J. SICK, P. L. LUTZ, J. C. LAMANNA, and M. ROSENTHAL (Miami, University, Miami, FL) (International Satellite Symposium on Comparative Physiology of Respiration, Ohio State University, Columbus, OH, Oct. 11, 12, 1981.) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Dec. 1982, p. 1354-1359. refs  
(Contract NIH-NS-06300; NIH-NS-14319; NIH-NS-14325; NIH-NS-16555 ; NIM-NS-00399)

#### A83-17329

##### EFFECT OF CHANGE IN P50 ON EXERCISE TOLERANCE AT HIGH ALTITUDE - A THEORETICAL STUDY

H. Z. BENCOWITZ, P. D. WAGNER, and J. B. WEST (California, University, La Jolla, CA) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Dec. 1982, p. 1487-1495. Research supported by the Parker B. Francis Foundation refs  
(Contract NIH-HL-17731-07)

Acclimatization to altitude often results in a rightward shift of the O<sub>2</sub> dissociation curve (ODC). However, a left-shifted ODC is reported to increase exercise tolerance in humans at medium altitude and increase survival in rats breathing hypoxic gas mixtures. This paradox was examined using a computer model of pulmonary gas exchange. A Bohr integration procedure allowed for alveolar-capillary diffusion. When diffusion equilibration was complete, mixed venous and arterial Po<sub>2</sub> fell as O<sub>2</sub> consumption (Vo<sub>2</sub>) was increased, but mixed Venous Po<sub>2</sub> approached a plateau. Under these conditions, a right-shifted ODC is advantageous at all but very high altitudes. However, diffusion limitation of O<sub>2</sub> transfer may occur at any altitude if Vo<sub>2</sub> is increased sufficiently. If this occurs, a left-shifted ODC results in higher calculated Vo<sub>2</sub>(max) compared with the standard ODC. Further, diffusion limitation always occurs at a lower Vo<sub>2</sub> with a right-shifted ODC than with a left-shifted ODC. It is concluded that whether a leftward or rightward shift in the ODC is advantageous to gas exchange at altitude depends on the presence or absence of diffusion limitation. (Author)

#### A83-17330

##### SURFACTANT HOMEOSTASIS IN THE RAT LUNG DURING SWIMMING EXERCISE

T. E. NICHOLAS, J. H. T. POWER, and H. A. BARR (South Australia, Flinders University, Bedford Park, Australia) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Dec. 1982, p. 1521-1528. Research supported by the National Health and Medical Research Council of Australia. refs

#### A83-17333

##### PULMONARY MICROCIRCULATORY RESPONSE TO LOCALIZED HYPERCAPNIA

T. KOYAMA and M. HORIMOTO (Hokkaido University, Sapporo, Japan) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Dec. 1982, p. 1556-1564. Ministry of Education of Japan refs  
(Contract MOE 577336)

The effects of localized hypercapnia on the red blood cell velocity in pulmonary alveolar microvessels on the exposed lung surface are investigated in anesthetized bullfrogs. The red blood cell velocity is measured by the use of a laser Doppler microscope, and the mean flow velocity (MV) and pulsatile amplitude (PA) are determined from the resulting flow velocity contours. Results show that during hypercapnia both MV ( $2.31 \pm 0.27$  mm/s) and PA ( $0.54 \pm 0.15$  mm/s) in the alveolar arterioles decreased,

with each reaching a minimum ( $2.01 \pm 0.24$  and  $0.43 \pm 0.19$  mm/s, respectively) prior to gradual returns to their initial values. It is found that the maximum reduction of PA (-44.6%) exceeded that of MV (-12.4%) in capillary flow. Calculations using an analog model indicate that the reduction in diameter of the arteriolar system could reduce PA more than MV in the pulmonary capillary network. Since the time course of the velocity change closely resembled that of the diameter change in relatively large arterioles, (larger than 200 microns in diameter), it is concluded that vasoconstriction of the arterioles are the major cause of these decrements in MV and PA. N.B.

#### A83-17334

##### TEMPERATURE AND ADRENOCORTICAL RESPONSES IN RHESUS MONKEYS EXPOSED TO MICROWAVES

W. G. LOTZ and R. P. PODGORSKI (U.S. Naval Aerospace Medical Center, Aerospace Medical Research Laboratory, Pensacola, FL) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Dec. 1982, p. 1565-1571. Navy-supported research. refs

To determine if the endocrine response to microwave exposure was similar in a primate to that reported for other animals, rectal temperature and plasma levels of cortisol, thyroxine (T<sub>4</sub>), and growth hormone (GH) were measured in rhesus monkeys exposed to 1.29-GHz microwave radiation. Exposures were carried out under far-field conditions with the monkey restrained in a chair. Incident power densities of 0, 20, 28, and 38 mW/sq cm were used, with corresponding specific absorption rates of 0, 2.1, 3.0, and 4.1 W/kg. Blood samples were taken hourly via an indwelling jugular venous catheter over a 24-h period before, during, and after an 8-h exposure. Rectal temperature increased an average of 0.5, 0.7, and 1.7 C for the three intensities used. No changes in T<sub>4</sub> or GH were observed. Cortisol levels were increased during exposure to 38 mW/sq cm. It was concluded that the temperature and adrenocortical responses to microwave exposure of the rhesus monkey are similar to the corresponding responses of other animals. (Author)

#### A83-17336

##### ATTENUATION OF HYPOXIC PULMONARY VASOCONSTRICTION BY PULSATILE FLOW IN DOG LUNGS

T. J. GREGORY, J. C. NEWELL, T. S. HAKIM, M. G. LEVITZKY, and N. SEDRANSK (Rensselaer Polytechnic Institute, Troy, NY) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Dec. 1982, p. 1583-1588. refs  
(Contract NIH-HL-18630)

#### A83-17339

##### REGIONAL CIRCULATORY RESPONSES TO HEAD-OUT WATER IMMERSION IN ANESTHETIZED DOG

J. A. KRASNEY, D. R. PENDERGAST, E. POWELL, B. W. MCDONALD, and J. R. PLEWES (New York, State University, Buffalo, NY) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Dec. 1982, p. 1625-1633. refs  
(Contract NIH-HL-14414; NIH-HL-23190; NIH-HL-28542)

#### A83-17598

##### EMOTIONAL STRESSES AND THEIR ROLE IN CEREBROVISCERAL DISTURBANCES [EMOTSIONAL'NYE STRESSY I IKH ROL' V TSEREBRO-VISTSERAL'NYKH NARUSHENIIAKH]

F. P. VEDIAEV, N. I. VELICHKO, O. IU. MAIOROV, and L. V. CHERNOBAI (Khar'kovskii Meditsinskii Institut, Kharkov, Ukrainian SSR) *Fiziologicheskii Zhurnal (Kiev)*, vol. 28, Nov.-Dec. 1982, p. 714-720. In Russian. refs

Several models of emotional stress are evaluated by investigating their hormonal (corticosterone) and cardiac (EKG) correlations, emphasizing the appearance of factors of individual resistance or predisposition to stress. The morphofunctional myocardial disturbances and the age-related peculiarities of the cardiac correlations are analyzed, and the effect of social deprivation during emotional stress is examined. Positive

correlations for neurodynamic and endocrine-vegetative parameters are found for these models of emotional stress. N.B.

## A83-17599

**CURRENT IDEAS ABOUT THE MECHANISM OF THE ACTION OF GLUCOCORTICOID HORMONES [SOVREMENNYE PREDSTAVLENIYA O MEKHAIZME DEISTVIA GLUKOKORTIKOIDNYKH GORMONOV]**

V. P. KOMISSARENKO, N. D. TRONKO, and A. G. MINCHENKO (Kievskii Institut Endokrinologii i Obmena Veshchestv, Kiev, Ukrainian SSR) Fiziologicheskii Zhurnal (Kiev), vol. 28, Nov.-Dec. 1982, p. 721-733. In Russian. refs

A review is presented of recent studies concerning the nature and function of glucocorticoid hormones, powerful and specific regulators of metabolism in many organs and tissues of humans and animals. Topics discussed include the receptors of the glucocorticoid hormones, the linkages of the glucocorticoid hormones with their receptors and the translocation of the unit into the nucleus, the linkage of these hormones with DNA and chromatin proteins, and the action of these hormones on the synthesis of RNA in the nucleus. Also examined are the action of glucocorticoid hormones on the synthesis and translation by mRNA of induced proteins, the action of these hormones on the expression of the mitochondrial genome, and the significance of the metabolism of these hormones for the mechanism of their action. N.B.

## A83-17600

**THE PECULIARITIES OF THE FUNCTIONAL CONDITION OF THE ADRENAL CORTEX IN OLD RATS DURING IMMOBILIZATION STRESS [OSOBENOSTI FUNKSIONAL'NOGO SOSTOIANIYA KORY NADPOCHECHNIKOVA U STARYKH KRYV PRI IMMOBILIZATSIONNOM STRESSE]**

E. V. MOROZ (Akademiya Meditsinskikh Nauk SSSR, Kiev, Ukrainian SSR) Fiziologicheskii Zhurnal (Kiev), vol. 28, Nov.-Dec. 1982, p. 752-755. In Russian. refs

## A83-17636

**THE ELECTRIC REACTIONS OF THE CAT BRAIN TO LIGHT FOLLOWING THE SECTION OF THE OPTIC TRACTS [ELEKTRICHESKIE REAKTSII MOZGA KOSHKI NA SVET POSLE PEREREZKI ZRITEL'NYKH TRAKTOV]**

N. A. ZUBROVA, V. V. LAVROV, and I. U. KRATIN (Akademiya Nauk SSSR, Institut Fiziologii, Leningrad, USSR) Akademiya Nauk SSSR, Doklady, vol. 267, no. 2, 1982, p. 486-488. In Russian. refs

## A83-17637

**CHANGES IN THE AFFINITY OF THE RESPIRATORY ENZYMES FOR OXYGEN AS A FACTOR OF THE PHYSIOLOGICAL REGULATION OF OXYGEN SUPPLY TO THE TISSUES [IZMENENIE SRODSTVA DYKHATEL'NYKH FERMENTOV K KISLORODU KAK FAKTOR FIZIOLOGICHESKOI REGULATSII KISLORODNOGO SNABZHENIYA TKANEI]**

K. P. IVANOV (Akademiya Nauk SSSR, Institut Fiziologii, Leningrad, USSR) and E. G. LIABAKH (Akademiya Nauk Ukrainskoi SSR, Institut Kibernetiki, Kiev, Ukrainian SSR) Akademiya Nauk SSSR, Doklady, vol. 267, no. 2, 1982, p. 489-492. In Russian. refs

The role of changes in the affinity of the respiratory enzymes for oxygen on the supply of oxygen to the tissues is investigated within the framework of a mathematical model for the volume diffusion of oxygen in the capillary cells of the rat skeletal muscles. It is shown that changes in the affinity of the enzymes for oxygen as small as fractions of mm Hg (based on the Michaelis constant) can produce significant changes in PO<sub>2</sub> and its distribution in the tissues. A greater affinity of the enzymes for oxygen provides for more complete oxygen extraction from the blood and, to a certain extent, improves oxygen supply to the tissues. However, the full physiological effect of this factor is realized only in conjunction with an increased blood flow rate in the tissues. V.L.

## A83-17638

**THE RESPONSE OF THE NEURONS OF THE VISUAL CENTERS OF THE RABBIT BRAIN TO ELECTRIC STIMULI AND A COMBINATION OF THE LATTER WITH NONVISUAL STIMULI [OTVETY NEIRONOV ZRITEL'NOI KORY KROLIKA NA ELEKTRICHESKIE STIMULY I IKH SOCHETANIE S NEZRITEL'NYMI RAZDRAZHITELIAMI]**

V. B. POLIANSKII, G. L. RUDERMAN, A. V. LATANOV, and L. G. VORONIN (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR) Akademiya Nauk SSSR, Doklady, vol. 267, no. 2, 1982, p. 492-496. In Russian. refs

## A83-17794

**A CIRCULATING INHIBITOR OF /NA+/ + K/+// ATPASE ASSOCIATED WITH ESSENTIAL HYPERTENSION**

J. M. HAMLYN, R. RINGEL, J. SCHAEFFER, P. D. LEVINSON, A. A. KOWARSKI, M. P. BLAUSTEIN (Maryland, University, Baltimore, MD), and B. P. HAMILTON (U.S. Veterans Administration Hospital, Baltimore, MD) Nature, vol. 300, Dec. 16, 1982, p. 650-652. Research supported by MDA, NSF, and NIH. refs

## A83-18188

**ROLE OF LUNG SURFACTANT IN CEREBRAL DECOMPRESSION SICKNESS**

B. D. BUTLER and B. A. HILLS (Texas, University, Houston, TX) Aviation, Space, and Environmental Medicine, vol. 54, Jan. 1983, p. 11-15. refs

Five dogs have been embolized by air infusion into the venous system, then sacrificed and the pulmonary vasculature isolated by ligatures while ventilation was maintained for a further hour. In a sixth animal, the embolization was omitted. The lungs were back-perfused with plasma from the same dog and successive aliquots of the back-flushings analyzed by thin-layer chromatography (TLC), each spot being removed for phosphorus determination. The results showed that the major lipid component was the phosphatidyl cholines, while lysophosphatidyl cholines, phosphatidyl ethanolamines, and sphingomyelins were also identified in significant quantities. A phosphorus balance for the lungs showed a significant migration of phospholipids from the tissue into pulmonary blood, phosphatidyl cholines increasing by a factor of 10.6. This migration of surfactant is discussed as an important factor in determining whether trapped pulmonary air emboli are released into the arterial system when their surface area is reduced by pressurization, suggesting that recompression should not be too rapid. (Author)

## A83-18189

**ROLE OF IMPACT VELOCITY AND CHEST COMPRESSION IN THORACIC INJURY**

D. C. VIANO and V.-K. LAU (GM Research Laboratories, Warren, MI) Aviation, Space, and Environmental Medicine, vol. 54, Jan. 1983, p. 16-21. refs

Impact velocity and chest compression are important factors in traumatic injury; however, there is no functional relationship to assess impact severity. A blunt thoracic impact of constant velocity (5-22 m/s) and prescribed contact displacement (3-46 mm) was delivered to 123 anesthetized rabbits. Myocardial and major vascular injury increased from contusion to rupture with cardiac tamponade and sudden death as either impact velocity or chest compression was independently increased. A theoretical relationship was found for impact severity:  $IS = VC/1-C$ , where V and C are impact velocity and normalized chest compression. Based on the frequency of critical/fatal injury, probit analysis gave  $IS = 6.4$  m/s as an estimate of the ED(50) response in the experimental model. (Author)

**A83-18248****GLOBULAR PROTEINS, GU WOBBLING, AND THE EVOLUTION OF THE GENETIC CODE**

J. JURKA, Z. KOLOSZA (Institute of Oncology, Gliwice, Poland), and I. ROTERMAN (Akademia Medyczna, Krakow, Poland) *Journal of Molecular Evolution*, vol. 19, Dec. 1982, p. 20-27. Research supported by the Jakub hr. Potocki Foundation and Max-Planck-Gesellschaft zur Foerderung der Wissenschaften. refs

It has previously been shown that the formation of GU base pairs in RNA copying processes leads to an accumulation of G and U in both strands of the replicating RNA, which results in a nonrandom distribution of base triplets. In the present paper, this distribution is calculated, and, using the chi-squared, a correlation between the distribution of triplets and the amino acid composition of the evolutionarily conservative interior regions of selected globular proteins is established. It is suggested that GU wobbling in early replication of RNA could have led to the observed amino acid composition of present-day protein interiors. If this hypothesis is correct, then GU wobbling must have been very extensive in the imprecisely replicating RNA, even reaching values close to the critical for stability of its double-helical structure. Implications of the hypothesis both for the evolution of the genetic code and of proteins are discussed. (Author)

**A83-18341****THE EFFECTS ON RAT BONES OF A PROLONGED CENTRIFUGATION - RESULTS OF A MORPHOMETRICAL ANALYSIS [EFFETS OSSEUX D'UNE CENTRIFUGATION PROLONGEE CHEZ LE RAT-RESULTATS DE L'ANALYSE MORPHOMETRIQUE]**

C. NOGUES and M. PEUCHMAUR (Centre d'Etudes et de Recherches de Medecine Aerospatiale, Laboratoire Central de Biologie Aerospatiale, Paris, France) *Medecine Aeronautique et Spatiale*, vol. 21, 3rd Quarter, 1982, p. 199-202. In French. refs

An experimental method is developed for studying the effects on the histology of the bones in rats by a centrifugation at 2 g for 18 days. Attention is focused on developing techniques for the fixation, the enclosing, and the staining of the bones not decalcified during centrifugation in order to allow histodynamical and histomorphometric analyses. The results of these types of studies can be compared to those obtained in investigations on the effects of weightlessness on bones. The implications of these results for conceptions of bone remodelling are also examined. N.B.

**A83-18342****AN EXPERIMENTAL STUDY OF THE EFFECTS OF HYPOBARIC HYPOXIA ON THE CEREBRAL BLOOD FLOW AND THE METABOLISM OF THE BRAIN [ETUDE EXPERIMENTALE DES EFFETS D'UNE HYPOXIE HYPOBARE SUR LE DEBIT SANGUIN CEREBRAL ET LE METABOLISME CEREBRAL]**

M. LE PONCIN-LAFITTE, J. RAPIN, G. GROSDMOUGE (Centre Hospitalier Universitaire Saint-Antoine, Paris, France), P. C. PESQUIES (Centre d'Etudes et de Recherches de Medecine Aerospatiale, Paris, France), and J. R. RAPIN *Medecine Aeronautique et Spatiale*, vol. 21, 3rd Quarter, 1982, p. 203-207. In French. refs

The effect of simulated hypobaric hypoxia (equivalent to an altitude of 7180 m) on the metabolism and hemodynamics of the brain in rats is investigated. Results show that the reduced  $paO_2$  significantly increases the blood flow in all structures of the brain and also enhances the capture of deoxyglucose. However, the relative lack of oxygen does not allow glucose metabolism, and thus oxygen consumption decreases and the metabolism shifts toward the anaerobic pathway, resulting in an increase in the amount of lactates in the brain. It is concluded that hypobaric hypoxia suppresses the correlation between glucose consumption and blood flow due to the disruption of the regulatory processes which regulate the blood supply according to the needs of the brain cells. N.B.

**A83-18346****THE THERMAL EFFECT OF MICROWAVES DURING IRRADIATION WITH LOW ENERGY LEVELS. I [MISE EN EVIDENCE D'UN EFFET THERMIQUE DES MICROONDES AU COURS D'IRRADIATIONS A DE FAIBLES NIVEAUX D'ENERGIE. I]**

M. J. KLEIN, C. L. MILHAUD (Centre d'Etudes et de Recherches de Medecine Aerospatiale, Division de Neurophysiologie Appliquee, Paris, France), and L. STERU *Medecine Aeronautique et Spatiale*, vol. 21, 3rd Quarter, 1982, p. 219-225. In French. Direction des Recherches Etudes et Techniques refs (Contract DRET-80-1094)

The effect of a 30 min exposure to low energy microwaves (2.45 GHz, 2 and 5 mW/sq cm) was investigated using two classical hypothermia models of preclinical animal psychopharmacology. Results show that hypothermia induced in mice by oxotremorine and by apomorphine reaches a maximum 30 min after the injections of the drugs. The microwave radiation produces a significant heating (1 degree C) in previously hypothermic mice, while the same radiation levels do not influence the rectal temperature of the control animals. These results indicate that the mice are able to control the amount of calories introduced by low level microwave radiation since this heating can only be observed after a pharmacological inhibition of the thermoregulatory mechanisms. In addition, it is found that low level microwaves do not modify the permeability of the blood-brain barrier. N.B.

**A83-18350****A QUANTITATIVE DETERMINATION OF THE MICROORGANISMS IN MICROBIOLOGICAL INVESTIGATIONS OF ANTARCTIC GLACIERS [O KOLICHESTVENNOM UCHETE MIKROORGANIZMOV PRI MIKROBIOLOGICHESKOM ISSLEDOVANII TOLSHCHI LEDNIKOV ANTARKTIDY]**

S. S. ABYZOV, N. E. BOBIN, and B. B. KUDRIASHOV (Akademiia Nauk SSSR, Institut Mikrobiologii, Moscow; Leningradskii Gornyi Institut, Leningrad, USSR) *Akademiia Nauk SSSR, Izvestiia, Seria Biologicheskaiia*, Nov.-Dec. 1982, p. 897-905. In Russian. refs

Results are presented for microbiological analyses of an ice core, taken from the Central Antarctic Glacier, at up to 320 m in depth. It was found that the probability of detecting viable microorganisms, preserved in the glacier under deep anabiosis, was greater if liquid nutrient medium was used than for solid medium of the same composition. A quantitative determination of the microorganisms was carried out using the method of the germination of membrane filters, which were placed on the media after different volumes of the melted snow from the cores had been passed through them. Analyses of the liquid and solid media showed that viable microorganisms in the Antarctic Glacier are extremely rare and are irregularly distributed. N.B.

**A83-18369****THE CONTENT OF PHOSPHOGLYCERIDES IN RHODOTORULA RUBRA IN THREE OF ITS PHENOTYPES AS INFLUENCED BY THE LUNAR ENVIRONMENT DURING THE FLIGHT OF APOLLO 16 [SODERZHANIE FOSFOGLITSERIDOV V RHODOTORULA RUBRA V TREKH EGO FENOTIPAKH, PODVERGAVSHIKHSIA VOZDEISTVIU LUNNOI SREDY V POLETE 'APOLLO-16']**

D. DESKINS and P. VOLZ (Michigan, University, Ann Arbor, MI) *Kosmicheskie Issledovaniia*, vol. 20, Nov.-Dec. 1982, p. 946-950. In Russian. refs

The phosphoglycerides of three phenotypes of *Rhodotorula rubra* were investigated in the presence of the specific factors of space flight. It was found that the morphology and the total content of phosphoglycerides were different for each phenotype, with the phosphoglyceride content ranging from 29.3-45.8% of the dry weight of the cells. The specific phosphoglycerides varied according to the phenotypes, and several neutral fats were also detected. It is concluded that radiation at a wavelength of 254 nm was the most significant factor which influenced the production of lipids and the synthesis of phosphoglycerides. N.B.



**A83-18968**

**THE PARTICIPATION OF THE PALLIDUM IN THE MECHANISMS OF MEMORY [UCHASTIE BLEDNOGO SHARA V MEKHANIZMAKH PAMIATI]**

L. S. GAMBARIAN and ZH. S. SARKISIAN (Akademiia Nauk Armianskoi SSR, Institut Zoologii, Yerevan, Armenian SSR) Zhurnal Vysshei Nervnoi Deiatel'nosti vol. 32, Sept.-Oct. 1982, p. 852-857. In Russian. refs

The role of the pallidum in the mechanisms of the operative memory is investigated in cats using methods of the conditioned reflexes to various signals. Results show that animals with a bilateral partial lesion of the pallidum 'forget' the preliminary action of an electric current and act as if they had never before been subjected to electric stimulation. Bilateral partial lesions of the pallidum disrupt the memory of the alteration of digestive conditioned reflexes. In addition, preliminary bilateral pallidotomy leads to severe disturbances of the perceptual memory in the animals. N.B.

**A83-18969**

**RESPIRATORY RHYTHM AS ONE OF THE INDICATORS OF THE INTENSITY OF MOTIVATIONAL-EMOTIONAL REACTIONS IN RABBITS [RITM DYKHANIIA KAK ODIN IZ POKAZATELEI NAPRIAZHENNOSTI MOTIVATSIONNO-EMOTSIONAL'NYKH REAKTSII KROLIKOV]**

IU. E. VAGIN (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Zhurnal Vysshei Nervnoi Deiatel'nosti, vol. 32, Sept.-Oct. 1982, p. 875-878. In Russian. refs

**A83-18971**

**POSSIBLE MECHANISMS FOR THE ORGANIZATION OF THE STRUCTURE OF THE SLEEP-WAKEFULNESS CYCLE ACCORDING TO THE DATA OF FACTOR ANALYSIS [VOZMOZHNYE MEKHANIZMY ORGANIZATSII STRUKTURY TSIKLA SON-BODRSTVOVANIE PO DANNYM FAKTORNOGO ANALIZA]**

A. IA. MOGILEVSKII (Ministerstvo Zdravookhraneniia Ukrainkoi SSR, Nauchno-Issledovatel'skii Institut Nevrologii i Psikhiiatrii, Kharkov, Ukrainian SSR) and D. A. ROMANOV (Akademiia Nauk Ukrainkoi SSR, Fiziko-Tekhnicheskii Institut Nizkikh Temperatur, Kharkov, Ukrainian SSR) Zhurnal Vysshei Nervnoi Deiatel'nosti, vol. 32, Sept.-Oct. 1982, p. 932-938. In Russian. refs

The factors which determine the organization of the sleep-wakefulness cycle in cats is investigated on the basis of a thorough registration of its patterns. An analysis of the connections of the parameters of the sleep-wakefulness cycle structure shows that six factors determine the interaction of the parameters. These factors are defined as paradoxical sleep, the structure of slow-wave sleep, the transition to delta sleep, the sleep of medium depth, the stage of sleep spindles, and delta sleep. The determining role in the organization of the sleep-wakefulness cycle structure is played by the mechanisms of paradoxical sleep, as well as by the apparatuses which are responsible for the transitional processes between the stages. N.B.

**A83-18972**

**BLOCKING THE NEGATIVE DELTA WAVES IN THE RABBIT VISUAL CORTEX BY LIGHT FLASHES [BLOKADA VSPYSHKAMI SVETA OTRITSATEL'NYKH DEL'TA-VOLN V ZRITEL'NOI KORE KROLIKA]**

K.-K. A. GRINIAVICHIIUS (Meditsinskii Institut, Kaunas, Lithuanian SSR) Zhurnal Vysshei Nervnoi Deiatel'nosti, vol. 32, Sept.-Oct. 1982, p. 954-961. In Russian. refs

**A83-18978**

**THE LOCAL CEREBRAL BLOOD FLOW AND THE LOCAL VASCULAR REACTIVITY DURING BRAIN CONTUSIONS IN AN EXPERIMENT UNDER CONDITIONS OF ARTERIAL NORMAL TENSION AND HYPERTENSION [LOKAL'NYI MOZGOVOI KROVOTOK I MESTNAIA SOSUDISTAIA REAKTIVNOST' PRI USHIBE GOLOVNOGO MOZGA V EKSPERIMENTE V USLOVIAKH ARTERIAL'NOI NORMO- I GIPERTENSII]**

E. G. PEDACHENKO, G. A. KEVORKOV, and IU. P. VERKHOGLIADOV (Kievskii Nauchno-Issledovatel'skii Institut Neurokhirurgii, Kiev, Ukrainian SSR) Voprosy Neurokhirurgii, Sept.-Oct. 1982, p. 16-21. In Russian. refs

**A83-18980**

**THE STRUCTURE OF DNA AND THE TRANSFORMATION OF CELLS [STRUKTURA DNK I TRANSFORMATSIIA KLETOK]**

N. A. FEDOROV (Ministerstvo Zdravookhraneniia SSSR, Tsentral'nyi Nauchno-Issledovatel'skii Institut Gematologii i Perelivaniia Krovi, Moscow, USSR) Uspekhi Sovremennoi Biologii, vol. 94, Sept.-Oct. 1982, p. 163-173. In Russian. refs

A review is presented of recent research concerning the relationship of the differentiation and the transformation of cells. It is shown that the transformation of cells occurs both during the course of the development of the organism under the influence of natural factors of the regulation of differentiation, and under the influence of various physical, chemical, or biological agents which damage cellular DNA and appear as atypical functional and morphological signs. Differentiation gives rise to alterations in the fragments of DNA themselves, while transformation is a result of random (nonspecific) changes in the DNA, which are also expressed by the increase, loss, transposition, or modification of the genome or its adjacent sections. N.B.

**A83-18981**

**THE ULTRACYTOCHEMICAL ANALYSIS OF NUCLEAR RIBONUCLEOPROTEINS /RNP/ [UL'TRATSITOKHIMICHESKII ANALIZ IADERNYKH RIBONUKLEOPROTEIDOV /RNP/]**

I. B. BUKHVALOV (Ministerstvo Zdravookhraneniia SSSR, Vsesoiuznyi Nauchno-Issledovatel'skii Tsentr po Okhrane Zdorov'ia Materi i Rebenka, Moscow, USSR) Uspekhi Sovremennoi Biologii, vol. 94, Sept.-Oct. 1982, p. 174-183. In Russian. refs

Results of ultracytochemical (electron histochemical) studies concerning the physiological role of nuclear RNP and the enzymatic activity of its protein component are reviewed. Nuclear RNP can be classified morphologically into interchromatin and perichromatin granules, perichromatin fibrils, clustered bodies, and nucleoli. It is shown that the physiological functions of nuclear RNP are influenced by both the ribonuclear and protein components. The activity of several phosphohydrolases and NAD-pyrophosphorylases can be determined using the methods of ultracytochemistry on the protein components of RNP. In addition, the possible role of these enzymes in the processing of nuclear RNP and in its transport from the nucleus to the cytoplasm is examined. N.B.

**A83-18982**

**THE GENETICS OF IMMUNOGLOBULINS - SUCCESSES AND PROBLEMS [GENETIKA IMMUNOGLOBULINOV - USPEKHI I PROBLEMY]**

O. K. BARANOV (Akademiia Nauk SSSR, Institut Tsitologii i Genetiki, Novosibirsk, USSR) Uspekhi Sovremennoi Biologii, vol. 94, Sept.-Oct. 1982, p. 184-202. In Russian. refs

Studies concerning the molecular anatomy of the immunoglobulin genes and the transpositioning of their DNA segments during the processes of cellular differentiation and the immune response are reviewed. It is shown that these transpositionings result in the unification of several varied gene segments of DNA. In this manner, the selected expression of genetic information for the synthesis of a single polypeptide chain can be linked with the unique specificity of the active center of an antibody. The problem of the genetic determination of varied antibodies is examined in the light of recent results relating to the structural-functional organization of multigenic families of

immunoglobulins. Attention is focused on the peculiarities of the genetics and evolution of complex and latent allotypes, in view of the problems relating to the allelism of the allotypic genes of immunoglobulins. N.B.

#### A83-18983

**THE REGULATION OF THE BIOSYNTHESIS OF SEROTONIN IN THE CENTRAL NERVOUS SYSTEM [REGULIATSIIA BIOSINTEZA SEROTONINA V TSENTRAL'NOI NERVNOI SISTEME]**

N. G. LUTSENKO and N. N. SUVOROV (Moskovskii Khimiko-Tekhnologicheskii Institut, Moscow, USSR) *Uspekhi Sovremennoi Biologii*, vol. 94, Sept.-Oct. 1982, p. 243-252. In Russian. refs

A review is presented of recent findings concerning the localization in the brain of the key enzyme in the biosynthesis of serotonin, i.e., tryptophanhydroxylase, its isolation in pure form, its properties, and the effect of various factors on its activity and regulatory function. The mechanism of the action of tryptophanhydroxylase is compared to the mechanisms of the reactions which are catalyzed by the hydroxylases of the aromatic amino acids. The process of the regulation of the formation of serotonin in the central nervous system is examined in the light of the specific regulatory properties of tryptophanhydroxylase. N.B.

#### A83-18984

**STRUCTURAL FOUNDATIONS OF THE RELIABILITY OF THE FUNCTIONING OF CORTICAL NEURONS [STRUKTURNYE OSNOVY NADEZHNOСТИ FUNKTSIONIROVANIYA KORKOVYKH NEIRONOV]**

A. M. ANTONOVA (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) *Uspekhi Sovremennoi Biologii*, vol. 94, Sept.-Oct. 1982, p. 253-268. In Russian. refs

#### A83-18985

**THE BIOLOGICAL EFFECT OF ULTRAVIOLET RADIATION [BIOLOGICHESKOE DEISTVIE UL'TRAFIOLETOVOGO IZLUCHENIYA]**

V. A. BARABOI (Ministerstvo Zdravookhraneniia Ukrainoi SSR, Kievskii Nauchno-Issledovatel'skii Rentgeno-Radiologicheskii Onkologicheskii Institut, Kiev, Ukrainian SSR) *Uspekhi Sovremennoi Biologii*, vol. 94, Sept.-Oct. 1982, p. 269-283. In Russian. refs

A review of research concerning the biological effects of UV radiation is presented which shows that cells react to UV radiation by forming corresponding molecular products, including enzyme repair systems; by the development of photodynamic, genetic, and lethal effects; and by the stimulation and retardation of mitosis. These molecular and cellular processes are the bases of the reactions of the whole organism to UV radiation, such as erythema, photoophthalmia, and pigmentation, as well as the development of mutations, immunostimulation, and immunodepression. It is concluded that knowledge of the biological effects of UV radiation will be important for the application of UV radiation in the treatment of various diseases. N.B.

#### A83-18986

**THE EFFECT OF HYDROCORTISONE AND DIPLACINUM ON THE METABOLISM OF MUSCLE PROTEINS IN RATS [VLIANIE GIDROKORTIZONA I DIPLATSINA NA OBMEN MYSHCHECHNYKH BELKOV U KRYSA]**

M. V. NEZHENTSEV (Leningradskii Pediatricheskii Meditsinskii Institut, Leningrad, USSR) *Voprosy Meditsinskoi Khimii*, vol. 28, Sept.-Oct. 1982, p. 27-29. In Russian. refs

#### A83-18987

**THE EFFECT OF 24, 25-DIHYDROXYCALCIFEROL ON THE CHEMICAL COMPOSITION OF THE BONE TISSUE OF RATS DURING HYPOKINESIA [VLIANIE 24, 25-DIOKSIKHOLEKALTSIFEROLA NA KHIMICHESKII SOSTAV KOSTNOI TKANI KRYSA PRI GIPOKINEZII]**

I. N. SERGEEV, N. V. BLAZHEEVICH, V. B. SPIRICHEV, A. S. USHAKOV, M. S. BELAKOVSKII, N. E. SPITSYNA, and N. A. BOGOSLOVSKII (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) *Voprosy Meditsinskoi Khimii*, vol. 28, Sept.-Oct. 1982, p. 102-108. In Russian. refs

The possibility of correcting the phosphorous-calcium metabolism and reversing the bone destruction in rats during hypokinesia, similar to the effects of immobilization and prolonged space flights, by the action of 24, 25-dihydroxycalciferol is investigated. It is shown that severe hypokinesia in rats is characterized by hypocalcemia, the development of neurocalcinosis, and osteoporotic changes in the bone tissue. The application of 24, 25-dihydroxycalciferol at a daily dose of 1.25 micrograms/animal was found to inhibit the osteoporotic reactions, stimulate the mineralization of the diaphyses and epiphyses, and correct the hypocalcemia in rats under conditions of hypokinesia. No increase in nephrocalcinosis was found in the experimental animals, and no toxic effect was detected. N.B.

#### A83-18988

**PASSIVE BINDING OF  $Ca^{2+}$  BY FRAGMENTS OF THE SARCOPLASMIC RETICULUM OF FROG SKELETAL MUSCLES [PASSIVNOE SVIAZYVANIE  $Ca^{2+}$  FRAGMENTAMI SARKOPLAZMATICHESKOGO RETIKULUMA SKELETNYKH MYSHTS LIAGUSHKI]**

O. V. ESYREV, SH. S. SARSENOVA, ZH. K. USPANOVA, I. B. KNIAZEVSKAIA, and V. K. TURMUKHAMBETOVA (Akademiia Nauk Kazakhskoi SSR, Institut Fiziologii, Alma-Ata, Kazakh SSR) *Voprosy Meditsinskoi Khimii*, vol. 28, Sept.-Oct. 1982, p. 51-55. In Russian. refs

#### A83-18989

**THE EFFECT OF SHORT-TERM HYPOTHERMIA ON THE MONOAMINE OXIDASE ENZYME SYSTEM IN THE RAT BRAIN [VLIANIE KRATKOVREMENNOGO OKHLAZHDENIYA NA MONOAMINOKSIDAZNUIU FERMENTNUIU SISTEMU MOZGA KRYSA]**

G. F. MOLODTSOVA (Akademiia Meditsinskikh Nauk SSSR, Novosibirsk, USSR) *Voprosy Meditsinskoi Khimii*, vol. 28, Sept.-Oct. 1982, p. 36-40. In Russian. refs

#### A83-18990

**AN INVESTIGATION OF THE CHANGES IN THE OPIATE-LIKE, BOMBESIN-LIKE, AND P-LIKE SUBSTANCES IN RATS WITH STRESS-INDUCED ANESTHESIA [IZUCHENIE IZMENENII OPIAT-, BOMBEZIN- I SUBSTANTSI P-PODOBNYKH VESHCHESTV PRI OBEZBOLIVANII KRYSA, VYZVANNOM STRESSOM]**

E. O. BRAGIN, R. A. DURINIAN (Tsentrallyi Nauchno-Issledovatel'skii Institut Refleksoterapii, Moscow, USSR), T. MOODY, C. B. PERT, and A. PERT (Public Health Services, Bethesda, MD) *Voprosy Meditsinskoi Khimii*, vol. 28, Sept.-Oct. 1982, p. 44-48. In Russian. refs

#### A83-19373

**THE BEHAVIOR OF BLOOD SERUM PROTEINS SEPARATED BY ELECTROPHORESIS IN ANIMALS DURING HYPOKINESIA [ZACHOWANIE SIE BIALEK SUROWICY KRWI, ROZDZIELONYCH METODA DYSKELEKTROFOREZY, U ZWIERZAT W HIPOKINEZII]**

J. LOSY and R. BERNAT (Akademia Medyczna, Poznan, Poland) *Postepy Astronautyki*, vol. 15, no. 3, 1982, p. 45-52. In Polish. refs

The effect of hypokinesia on the blood serum proteins of rats is investigated through electrophoresis on polyacrylamide gel. After 15 days of hypokinesia, the overall content of protein in the serum is found to be 18% lower than the level in the control group.



Also detected are statistically significant reductions in the prealbumin and albumin fractions (29%) and in the fractions of postalbumin (11%) and posttransferrin (12%). It is concluded that hypokinesis has an appreciable effect on the distribution of blood serum proteins, especially in the prealbumin and albumin fractions. C.R.

## A83-19376

**FACTORS WHICH DETERMINE THE DIFFERENCES IN THE BIOLOGICAL EFFECTIVENESS OF IONIZING RADIATION WITH VARIOUS PHYSICAL CHARACTERISTICS [FAKTORY, OPREDELIAUSHCHIE RAZLICHIIA V BIOLOGICHESKOI EFEKTIVOSTI IONIZIRUIUSHCHIKH IZLUCHENII S RAZNYMI FIZICHESKIMI KHARAKTERISTIKAMI]**

V. I. KOROGODIN and E. A. KRASAVIN (Ob'edinennyi Institut Iadernykh Issledovaniy, Dubna, USSR) Radiobiologiya, vol. 22, Nov.-Dec. 1982, p. 727-738. In Russian. refs

The dependence of the radiosensitivity of prokaryotic and eukaryotic cells on the linear energy transfer (LET) is investigated. It is found that the character of the radiosensitivity-LET relationship is determined not only by the physical properties of the radiation, but also by the ability of the cells to repair double strand breaks (DSB) of DNA. The increase in the radiosensitivity of eukaryotic cells with an increase in LET is connected with a decrease in the repair of DSB of DNA during the action of densely ionizing particles. This decrease in the repair efficiency is apparently caused by the increase in the amount of linear DSB of DNA in comparison with enzymatic DSB. Possible modifications of the radiosensitivity-LET curves for radiosensitive and supersensitive mutants are examined. N.B.

## A83-19377

**FREE RADICALS INDUCED BY UV LIGHT IN AQUEOUS SOLUTIONS OF DNA WITH VARIOUS AMOUNTS OF PROTEIN AT 77 K [SVOBODNYE RADIKALY, INDUTSIROVANNYE UF-SVETOM V VODNYKH RASTVORAKH DNK S RAZLICHNYM SODERZHANIEM BELKA PRI 77 K]**

Z. P. GRIBOVA, V. M. ZHILTSOVA, O. A. AZIZOVA, and K. E. KRUGLIAKOVA (Akademiya Nauk SSSR, Institut Khimicheskoi Fiziki; Vsesoiuznyi Zaochnyi Politehnicheskii Institut; II Moskovskii Meditsinskii Institut, Moscow, USSR) Radiobiologiya, vol. 22, Nov.-Dec. 1982, p. 739-744. In Russian. refs

## A83-19378

**A COMPARATIVE ANALYSIS OF THE EFFECT OF ALKYLATING AGENTS, IONIZING RADIATION, AND ULTRAVIOLET LIGHT ON THE MAMMALIAN CELL PROGRESSION IN THE MITOTIC CYCLE. I - THE EFFECT OF N-METHYL-N'-NITRO-N-NITROSOGUANISINE ON THE PASSING OF VARIOUS PHASES OF THE CYCLE BY HELA CELLS [SRAVNITEL'NYI ANALIZ VLIYANIYA ALKILIRUIUSHCHIKH AGENTOV, IONIZIRUIUSHCHIKH I UL'TRAIOLETOVOGO IZLUCHENII NA PROGRESSIU KLETOK MLEKOPITAIUSHCHIKH PO MITOTICHESKOMU TSIKLU. I - VLIYANIE N-METIL-N'-NITRO-N-NITROZOGUANIDINA NA PROKHOZHDENIE KLETKAMI HELA RAZNYKH FAZ TSIKLA]**

G. B. BELOSTOTSKAIA and O. V. MALINOVSKII (Akademiya Nauk SSSR, Leningradskii Institut Iadernoi Fiziki, Gatchina, USSR) Radiobiologiya, vol. 22, Nov.-Dec. 1982, p. 759-763. In Russian. refs

## A83-19379

**STRUCTURAL AND FUNCTIONAL CHANGES IN THE HEMOGLOBIN OF IRRADIATED DOGS [STRUKTURNYE I FUNKTSIONAL'NYE IZMENENIYA V GEMOGLOBINAKH OBLUCHENNYKH SOBAK]**

B. F. SUKHOMLINOV, A. V. SAVICH, L. S. STARIKOVICH, and E. P. DUDOK (L'vovskii Gosudarstvennyi Universitet, Lvov, Ukrainian SSR) Radiobiologiya, vol. 22, Nov.-Dec. 1982, p. 764-768. In Russian. refs

The structural and functional changes in the hemoglobin of dogs after total body irradiation at a dose of 4.0 gram Roentgens were separated into four chromatographic fractions and

investigated. A comparative analysis of the major components shows variations in the structure of the hemoglobin in the irradiated dogs. The percentage of the structurally modified beta-chain was determined at various periods of time after irradiation. The relationship between the structural changes that were detected and the impairment of the oxygen-binding properties of hemoglobin was examined. N.B.

## A83-19380

**AN EVALUATION OF THE CARCINOGENIC EFFECT OF RADIATION AT THE CELLULAR LEVEL [OB OTSENKE KANTSEROGENNOGO DEISTVIA IZLUCHENIIA NA KLETOCHNOM UROVNE]**

I. V. FILIUSHKIN and I. M. PETOIAN Radiobiologiya, vol. 22, Nov.-Dec. 1982, p. 781-786. In Russian. refs

It is proposed that the practical evaluation of carcinogenic risk from low-level radiation should be based on the assumption that the initiating event in the target cells is the formation of symmetrical chromosomal translocations. This hypothesis is based on an analysis of the patterns of the radiation effects on mammalian cells and on theoretical generalizations concerning the etiopathogenesis of cancer. It is shown that the hypothesis of symmetrical translocations not only does not contradict the findings of theoretical oncology, but also removes a number of contradictions in the mutagen theory of cancer. An equation is proposed for the dose dependence of the incidence of precarcinogenic changes in cells, which is shown to agree with experimental data on the induction of leukosis in mice by a single exposure to ionizing radiation. N.B.

## A83-19381

**THE EFFECT OF HEAVY IONS ON MAMMALIAN CELLS. II - THE EVALUATION OF THE RELATIVE BIOLOGICAL EFFECTIVENESS OF ACCELERATED IONS OF HELIUM, CARBON, AND NEON ACCORDING TO CYTOGENETIC PARAMETERS [DEISTVIE TIAZHELYKH IONOV NA KLETKI MLEKOPITAIUSHCHIKH. II - OTSENKA OBE USKORENNYKH IONOV GELIIA, UGLERODA I NEONA PO TSITOGENETICHESKIM POKAZATELIAM]**

R. D. GOVORUN, O. A. SMIRNOVA, and N. I. RYZHOV (Ministerstvo Zdravookhraneniya, Institut Mediko-Biologicheskikh Problem, Moscow, USSR) Radiobiologiya, vol. 22, Nov.-Dec. 1982, p. 791-795. In Russian. refs

## A83-19382

**A STUDY OF THE ADAPTATION PROCESSES IN THE PERIPHERAL BLOOD USING METHODS OF MATHEMATICAL MODELING [ISSLEDOVANIYE ADAPTATSIONNYKH PROTSESSOV V PERIFERICHESKOI KROVI S ISPOL'ZOVANIEM METODOV MATEMATICHESKOGO MODELIROVANIYA]**

M. I. ANTONONOV and N. M. GONCHAR (Nauchno-Issledovatel'skii Institut Obshchei i Kommunal'noi Gigieny, Kiev, Ukrainian SSR) Radiobiologiya, vol. 22, Nov.-Dec. 1982, p. 805-810. In Russian. refs

Results are presented from a cytochemical study of the neutrophils of the peripheral blood of rats during the effect of microwaves at 2375 MHz and 500 microW/sq cm. A hypothesis is proposed about the presence of cumulative and adaptive components in the reaction of the blood system. A cumulation curve is developed on the basis of experimental data, and the form of the adaptive component is determined. N.B.

A83-19383

**THE ACTIVITY OF CA/2+/- ATPASE AND ENZYMES OF CAMP METABOLISM IN THE NERVE TISSUE OF RATS DURING THE EARLY STAGES OF ACUTE RADIATION DAMAGE [AKTIVNOST' CA/2+/-ATFAZY I FERMENTOV METABOLIZMA TSAMF V NERVNOI TKANI KRYA NA RANNIKH STADIAXH OSTROGO LUCHEVOGO PORAZHENIA]**

A. N. VASILEV, V. I. GAVRILEI, V. D. GRINCHUK, A. V. MAIDANIUK, O. P. MATYSHEVSKAIA, G. G. MELNIK, L. I. OSTAPCHENKO, T. I. PARKHOMETS, L. I. TOMACHINSKAIA, and N. E. KUCHERENKO (Kievskii Gosudarstvennyi Universitet, Kiev, Ukrainian SSR) *Radiobiologiya*, vol. 22, Nov.-Dec. 1982, p. 815-817. In Russian. refs

A83-19384

**THE RADIOSENSITIVITY OF THE ORGANISM DURING THE IRRADIATION OF ANIMALS IN AN ALTERED GASEOUS ENVIRONMENT. V - THE EFFECT ON ANIMALS OF THE COMBINED ACTION OF RADIATION AND PURE OXYGEN AT NORMAL PRESSURE [RADIOCHUVSTVITEL'NOST' ORGANIZMA PRI OBLUCHENII ZHIVOTNYKH V IZMENENNOI GAZOVOI SREDE. V - EFFEKT SOCHETANNOGO VOZDEISTVIA NA ZHIVOTNYKH RADIATSII I CHISTOGO KISLORODA PRI NORMAL'NOM DAVLENII]**

M. V. VASIN, T. S. LVOVA, L. V. KOROLEVA, V. V. ANTIPOV, and B. I. DAVYDOV *Radiobiologiya*, vol. 22, Nov.-Dec. 1982, p. 818-822. In Russian. refs

A83-19408\* National Biomedical Research Foundation, Washington, D. C.

**THE CHEMICAL STRUCTURE OF DNA SEQUENCE SIGNALS FOR RNA TRANSCRIPTION**

D. G. GEORGE and M. O. DAYHOFF (National Biomedical Research Foundation, Washington, DC) *Origins of Life*, vol. 12, Sept. 1982, p. 311-319. refs  
(Contract NASW-3317)

The proposed recognition sites for RNA transcription for *E. coli* NRA polymerase, bacteriophage T7 RNA polymerase, and eukaryotic RNA polymerase Pol II are evaluated in the light of the requirements for efficient recognition. It is shown that although there is good experimental evidence that specific nucleic acid sequence patterns are involved in transcriptional regulation in bacteria and bacterial viruses, among the sequences now available, only in the case of the promoters recognized by bacteriophage T7 polymerase does it seem likely that the pattern is sufficient. It is concluded that the eukaryotic pattern that is investigated is not restrictive enough to serve as a recognition site. N.B.

N83-14851\*# Alaska Dept. of Fish and Game, Fairbanks.

**SATELLITE RADIO TRACKING OF POLAR BEARS**

J. W. LENTFER and D. DEMASTER (Minnesota Univ., Minneapolis) *In NASA. Goddard Space Flight Center Nimbus 6 Random Access Meas. System Appl. Expt. p 52-53 Oct. 1982*  
Avail: NTIS HC A06/MF A01 CSCL 06C

The entire transmitter package weighed under 5 kg, making it smaller and lower in power than other Nimbus 6 transmitters. The design also included a loose-fitting, urethane neck collar design that would withstand the bear's abuse. The upper section of the collar contained the antenna, which would radiate a hemispherical pattern. A lexan box was used for the satellite communications electronics. The lower section of the collar (under the bear's neck) contained an 11-V lithium battery pack. In expanding the project, 11 bears, divided into three groups, were fitted with transmission collars and released at various points throughout Alaska, Canada, and Greenland. N.W.

N83-14859\*# National Oceanic and Atmospheric Administration, Bay St. Louis, Miss. National Space Technology Lab.

**SATELLITE-LINKED PORPOISE TRACKING SYSTEM**

E. G. WOODS and A. KEMMERER *In NASA. Goddard Space Flight Center Nimbus 6 Random Access Meas. System Appl. Expt. p 70-71 Oct. 1982*

Avail: NTIS HC A06/MF A01 CSCL 06C

The feasibility of using a prototype satellite-linked tracking system to follow movements of wild dolphins was demonstrated. A small, lightweight transmitter pack that could be carried for several months by these sleek animals was developed based on the porpoise's form and behavior and the specifications of the Nimbus satellite system. The unit consists of two connected cylindrical aluminum tubes with the electronics contained in one side and the batteries in the other. Two wild Hawaiian spotted porpoises were instrumented with these prototypes and successfully tracked using the Nimbus 6 satellite for two and seven days. J.M.S.

N83-14887 Defence Research Information Centre, Orpington (England).

**SPECTRAL LUMINESCENCE CHARACTERISTICS OF SEVERAL SPECIES OF SEA ALGAE**

P. P. MARTSENYUK and V. N. KARNAUKHOV Jul. 1982 11 p refs Transl. into ENGLISH from *Biol. Morya* (Kiev), v. 51, 1979 p 55-59

(DRIC-T-6618; BR84488) Avail: Issuing Activity

The luminescence spectra of single cells of several species of sea algae in the normal state, and as affected by radiation in the visible region of the spectrum, were studied. Differences observed in the initial luminescence spectra and in the changes of the spectra during pigment photodestruction are discussed. The data show that the luminescent spectral characteristics can be used as an additional criterion for determining the taxonomic position of algal cells. Author (ESA)

N83-14888 Defence Research Information Centre, Orpington (England).

**THE SPECTRAL COMPOSITION OF THE BIOLUMINESCENT FIELD IN THE BLACK AND MEDITERRANEAN SEAS AND IN THE ATLANTIC OCEAN**

E. P. BITYUKOV, V. I. VASILENKO, and Y. N. TOKAREV Aug. 1982 21 p refs Transl. into ENGLISH from *Biol. Morya* (Kiev), v. 47, 1978 p 40-49

(DRIC-T-6619; BR84487) Avail: Issuing Activity

The spectral composition of the bioluminescence of pelagic organisms and of the luminous field created by them were studied. Determination of the bioluminescent field spectrum by a spectrophotometer with three detectors is described. The spectrum maximum in the Black Sea and the tropical Atlantic is 480nm, while in the Mediterranean it is shifted by 10 to 15nm towards the long wave region. Author (ESA)

N83-14889# American Association for the Advancement of Science, Washington, D.C.

**LIFE SCIENCES IN THE SERVICE OF ALASKA. PROCEEDINGS OF THE 32ND ALASKA SCIENCE CONFERENCE**

1981 209 p Proc. Held at Fairbanks, Alaska, 25-27 Aug. 1981 (Contract DE-AT06-81ER-60026)

(DE82-001744; DOE/ER-60026-1; CONF-810883) Avail: NTIS HC A10/MF A01

Life science in Alaska was examined. Proceedings include papers in the basic biological sciences as related to Alaska and the Canadian Arctic regions. The present and potential impacts of man on the Alaskan environment are also considered. Author

## 51 LIFE SCIENCES (GENERAL)

**N83-14890#** Washington Univ., Seattle.

**LYMPHOCYTE FORMATION, LIFE SPAN, FATE AND POTENTIAL FOR REPOPULATING HEMOPOIETIC TISSUES OF IRRADIATED ANIMALS** Progress Report, 1977 - 1978

N. B. EVERETT 1981 5 p refs

(Contract DE-AT06-76EV-70016; AT(45-1)-2225)

(DE82-002435; RLO-2225/T16-41) Avail: NTIS HC A02/MF

A01

Research progress for the year 1977-1978 is summarized. The objectives were to explore the capacity of bone marrow pre-T cells for generating immunocompetent progeny after transplantation, and to characterize pre-B cells in the bone marrow and spleen. GRA

**N83-16011#** Army Intelligence and Threat Analysis Center, Arlington, Va.

**MILITARY MEDICAL JOURNAL, NO. 7, 1982**

1982 134 p refs Transl. into ENGLISH of Voenno-Med. Zh. (Moscow), No. 7, Jul. 1982

(L-2129) Avail: NTIS HC A07/MF A01

Heat adaptation, thermal stress, and the effect of Coriolis acceleration are discussed.

**N83-16015#** Naval Oceanographic Office, Washington, D. C.

**A PROTOTYPE BIOLUMINESCENCE PHOTOMETER**

M. L. GEIGER Feb. 1981 59 p refs

(AD-A119807; NOO-TR-280) Avail: NTIS HC A04/MF A01

CSSL 08A

A bioluminescence photometer system, a vertically-lowered device that records flashes of light produced when small bioluminescent marine organisms are pumped into a turbulent flow regime chamber where they are viewed by a photomultiplier tube, is discussed. The history and performance of this device are documented. The combined results of experience at sea and engineering performance evaluations suggest that the present instrument is a useful tool for mapping dinoflagellate bioluminescence capabilities within the upper ocean. A recent modification (based on a twelve-conductor set of winch slip rings) allowed continuous profiles of dinoflagellate light production to be recorded without significant decreases in sensitivity or signal degradation by noise. The present instrument is not useful for underway work or for measuring light produced by organisms of approximately 400 microns in length and larger. Several improvements can be made on the present device by experimenting with underway systems and with chamber sizes, shapes and flow regimes. GRA

**N83-16016#** Illinois Univ., Urbana-Champaign. Dept. of Botany. **DEVELOPMENT AND FUNCTION OF MEMBRANE SYSTEMS IN PLANT TISSUE** Progress Report, 15 Jul. 1980 - 15 Sep. 1981

1 Oct. 1981 9 p refs

(Contract DE-AS02-76EV-00790)

(DE82-002113; DOE/EV-00790/005) Avail: NTIS HC A02/MF A01

Over the past 14 months, investigations of ion transport mechanisms in corn roots and mitochondria have continued. With mitochondria, citrate and malate can be transported by a mechanism that does not involve exchange for phosphate. Evidence exists for an anion/H<sup>+</sup> co-transport mechanism which will function under both energized and passive conditions. In the root investigations, it was found that any injury or shock results in blockage of the H<sup>+</sup> efflux pumping mechanism, and that FC restores the activity. Studies with inhibitors indicate the H<sup>+</sup> channel of the ATPase to be the site of control. Injury or shock appears to act by making the membrane permeable to Ca<sup>2+</sup>, which appears to directly or indirectly act to inhibit the ATPase. Preliminary work with isolated plasma-lemma preparations supports this view. DOE

**N83-16017#** Pacific Northwest Lab., Richland, Wash.

**HISTOPATHOLOGIC, MORPHOMETRIC, AND PHYSIOLOGIC INVESTIGATION OF LUNGS OF DOGS EXPOSED TO URANIUM-ORE DUST**

F. T. CROSS, R. E. FILIPY, S. M. LOSCUTOFF, P. J. MIHALKO, R. F. PALMER, and R. H. BUSCH 1981 8 p refs Presented at the Intern. Conf. on Radiation Hazards in Mining: Control, Measurement, and Medical Aspects, Golden, Col., 4 Oct. 1981

(Contract DE-AC06-76RL-01830)

(DE82-003855; PNL-SA-9927; CONF-8110111-2) Avail: NTIS HC A02/MF A01

The most consistent pulmonary function change attributed to carnotite uranium ore dust exposure is an increased slope of the single breath N<sub>2</sub> washout curve, suggesting an uneven distribution of ventilation. This change was observed in dogs exposed for less than 1 year and continued through 4 years of exposure. Measurements of pulmonary resistance, after 27, 40 and 47 months exposure, showed slight age related changes and increasing differences between control and exposed animals with duration of exposure. These two changes are suggestive of a bronchitic response, similar to the industrial bronchitis of mine workers. The most notable pulmonary lesions observed in dogs exposed for up to 4 years are: vesicular emphysema, peribronchiolitis and focal pneumoconiosis. Lesions of the major airways and upper respiratory tract, when present, were minimal in severity. Pulmonary vesicular emphysema was present in all but one of the examined dogs. DOE

**N83-16022\*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**METABOLIC EFFECTS OF HYPERGRAVITY ON EXPERIMENTAL ANIMALS**

J. OYAMA *In its* Space Gerontology p 37-52 Nov. 1982

Avail: NTIS HC A06/MF A01 CSSL 06C

Several experiments concerned with the exposure of animals to acute or chronic centrifugation are described. The effects of hypergravity particularly discussed include the decreased growth rate and body weight, increased metabolic rate, skeletal deformation, and loss of body fat. M.G.

**N83-16023\*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**EFFECTS OF HYPERGRAVITY ON RAT LIVER REGENERATION**

D. D. FELLER *In its* Space Gerontology p 53-54 Nov. 1982

Avail: NTIS HC A06/MF A01 CSSL 06C

The effects of centrifugation on liver regrowth were examined by measuring mitotic activity. The results indicate that the increased gravity caused a delay in the onset of mitotic activity and a significant decrease in overall mitotic activity. M.G.

**N83-16025\*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**EFFECTS OF WEIGHTLESSNESS ON BONE AND MUSCLE OF RATS**

E. M. HOLTON *In its* Space Gerontology p 59-66 Nov. 1982

Avail: NTIS HC A06/MF A01 CSSL 06C

Experiments studying the metabolic effects of hypogravity as related to muscle disuse atrophy and bone decalcification are discussed. M.G.

## AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and weightlessness.

A83-16950

**CURRENT ASPECTS OF PROPHYLAXIS AND TREATMENT OF HEARING DISORDERS IN PATIENTS WITH MENIERE'S DISEASE [SOVREMENNYE ASPEKTY PROFILAKTIKI I LECHENIIA RASSTROISTV SLUKHA U BOL'NYKH S BOLEZNIU MEN'ERA]**

V. T. PALCHUN and V. I. ASLAMAZOVA (II Moskovskii Meditsinskii Institut, Moscow, USSR) Vestnik Otorinolaringologii, Nov.-Dec. 1982, p. 39-46. In Russian. refs

A review is presented concerning methods for the prevention and treatment of hearing disorders in patients with Meniere's disease. It is proposed that Meniere's disease exhibits three stages of development, with each stage having its own inherent features that determines the choice of treatment. The first (initial) stage is characterized by a fluctuating neurosensory amblyacusia of various stages of expression. The second stage (the appearance of clinical symptoms) is also characterized by fluctuating neurosensory amblyacusia, with some indications of innerlabyrinthine damage to sound conduction and perception. The third stage (the growth of irreversible changes) is characterized by nonfluctuating neurosensory amblyacusia with strong indications of innerlabyrinthine damage to sound perception. Following a survey of different treatments for Meniere's disease, it is concluded that no general diagnosis and treatment should be utilized, and that the treatments should be based on the peculiarities of the specific stages of the disease, which correspond to the degree of damage to the functions of various organs of the body.

N.B.

A83-17151

**EVALUATION OF THE PHYSICAL EFFICIENCY OF BOXERS [OTSENKA FIZICHESKOI RABOTOSPOSOBNOSTI BOKSEROV]**

E. A. MATVEEVA, I. P. DEGTIAREV, I. V. TSIRGILADZE, and V. M. CHEREPANOV (Gosudarstvennyi Tsentral'nyi Institut Fizicheskoi Kul'tury, Moscow, USSR) Teoriia i Praktika Fizicheskoi Kul'tury, Oct. 1982, p. 12-14. In Russian. refs

A83-17152

**THE EFFECT OF DANGEROUS MOTIONS ON KINESTHESIA [VLIANIE OPASNYKH DVIZHENII NA MYSHECHNOE CHUVSTVO]**

G. A. KALASHNIKOV (Chernigovskii Pedagogicheskii Institut, Chernigov, Ukrainian SSR) Teoriia i Praktika Fizicheskoi Kul'tury, Oct. 1982, p. 14-16. In Russian.

Experiments are reported in which the subjects were asked to perform various types of physical exercise involving elements of danger (e.g., jumps while on a balance beam) or surprise (e.g., unexpected loud sounds), and their motor reactions were monitored using simple techniques. It is found that such exercise produces protective reactions resulting in reduced motion amplitude and muscular strength. Based on the data obtained, it is recommended that the element of danger be increased gradually during training to permit the athlete to develop the required motor skills.

V.L.

A83-17154

**THE ACTIVITY OF THE SYMPATHETIC-ADRENAL SYSTEM AS AN INDICATOR OF ATHLETES' ADAPTATION TO PHYSICAL LOADS AT HIGH TEMPERATURES [AKTIVNOST' SIMPATO-ADRENALOVOI SISTEMY KAK POKAZATEL' ADAPTATSII SPORTSMENOV K VYPOLNENIIU FIZICHESKIKH NAGRUZOK V USLOVIYAKH VYSOKOI TEMPERATURY VNESHNEI SREDY]**

L. S. GULIEVA (Azerbaidzhanskii Gosudarstvennyi Meditsinskii Institut, Baku, Azerbaidzhan SSR) Teoriia i Praktika Fizicheskoi Kul'tury, Oct. 1982, p. 20-22. In Russian. refs

A83-17155

**THE EFFECT OF MICROELEMENTAL ADDITIONS ON THE ACTIVITY OF CERTAIN METALLIC ENZYMES, IMMUNE STABILITY, AND PERFORMANCE OF ATHLETES [VLIANIE MIKROELEMENTNYKH DOBAVOK NA AKTIVNOST' NEKOTORYKH METALLOFERMENTOV, IMMUNOSTOICHIVOST' I RABOTOSPOSOBNOST' LEGKOATLETOV]**

V. IA. RUSIN, V. V. NASOLODIN, and I. P. GLADKIKH (Iaroslavskii Gosudarstvennyi Pedagogicheskii Institut; Iaroslavskii Gosudarstvennyi Universitet, Yaroslavl, USSR) Teoriia i Praktika Fizicheskoi Kul'tury, Oct. 1982, p. 23. In Russian.

A83-17156

**AGE-RELATED PATTERNS OF LATERAL MOVEMENT PREFERENCES [VOZRASTNAIA DINAMIKA LATERAL'NYKH DVIGATEL'NYKH PREDPOCHTENII]**

A. A. SAIDOV (Gosudarstvennyi Tsentral'nyi Institut Fizicheskoi Kul'tury, Moscow, USSR) Teoriia i Praktika Fizicheskoi Kul'tury, Oct. 1982, p. 28-30. In Russian. refs

The patterns of lateral movement asymmetry in various movement tasks are examined for 1320 subjects ranging in age from 6-12 years. The aspects studied included the determination of the quantitative distribution of individuals with various types of lateral movement preferences in various age groups, and the dependence between lateral movement preferences and the various movement tasks. Among other results, it was found that insignificant increases in the preference of right-sided movement occurred with age in movements of the upper extremities. In movements of the lower extremities, linked with the choice of jerks of the legs, a decrease in the right-sided movement preference was observed with age and an increase in the left-sided movement preference with age was noted. The results of correlational and factorial analysis confirm the acceptability of this method of testing for evaluating the various types of lateral movement preferences. The most informative test was found to be the movements of the upper extremities.

N.B.

A83-17157

**PRESENT-DAY PROBLEMS IN THE BIOCHEMISTRY OF PHYSICAL EXERCISE AND SPORT [SOVREMENNYE PROBLEMY BIOKHMII FIZICHESKOI KULTURY I SPORTA]**

I. A. SYTINSKII (Gosudarstvennyi Institut Fizicheskoi Kul'tury, Leningrad, USSR) Teoriia i Praktika Fizicheskoi Kul'tury, Oct. 1982, p. 47-49. In Russian. refs

A83-17159

**THE STATE OF HEPATIC CIRCULATION UNDER THE COMBINED EFFECT OF LEAD AND ELECTROMAGNETIC FIELDS [SOSTOIANIE KROVOOBRASHCHENIIA V PECHENII PRI KOMBINIROVANNOM VOZDEISTVII SVINTSA I ELEKTROMAGNITNYKH POLEI]**

M. S. TRINOS (Kievskii Nauchno-Issledovatel'skii Institut Gigieny Truda i Profzabolevanii, Kiev, Ukrainian SSR) and E. A. ODERII (Kievskii Institut Vsovershenstvovaniia Vrachei, Kiev, Ukrainian SSR) Vrachebnoe Delo, Aug. 1982, p. 109-111. In Russian. refs

## A83-17160

THE RELATIONSHIP BETWEEN THE PATIENT'S AGE, THE FUNCTION OF CERTAIN OF HIS REGULATORY SYSTEMS, AND MYOCARDIAL INFARCTION [VZAIMOSVIAZ' MEZH DU VOZRASTOM BOL'NOGO, FUNKTSIEI NEKOTORYKH EGO REGULATORYNYKH SISTEM I INFARKTOM MIOKARDA]

V. M. MALIUKOV (Khar'kovskii Meditsinskii Institut, Kharkov, Ukrainian SSR) Vrachebnoe Delo, Aug. 1982, p. 49-51. In Russian. refs

The paper discusses clinical observations of patients with myocardial infarction, where the diurnal urinary excretion of sex hormones and the functional state of the hypothalamo-pituitary system were investigated. It is shown that myocardial infarction mainly occurs in patients over the age of 50 years when the excretion of sex hormones is reduced, leading to a weakening of negative feedback on the hypothalamus, disintegration of its functions, and disease. B.J.

## A83-17162

CEREBRAL CIRCULATION AND THE HEMODYNAMICS OF LESSER CIRCULATION IN PATIENTS WITH BRONCHIAL ASTHMA IN COMBINATION WITH SYSTEMIC ARTERIAL HYPERTENSION [MOZGOVOE KROVOOBRASHCHENIE I GEMODINAMIKA V MALOM KRUGE U BOL'NYKH BRONKHIAL'NOI ASTMOI V SOCHETANII S SISTEMNOI ARTERIAL'NOI GIPERTENZIEI]

V. A. BOBROV and S. N. POLIVODA (Zaporozhskii Institut Usovorshtenstvovaniia Vrachei, Zaporozhe, Ukrainian SSR) Vrachebnoe Delo, Aug. 1982, p. 89-91. In Russian. refs

## A83-17167

ARTERIAL HYPERTONIA IN MINERS WORKING IN DEEP MINES [ARTERIAL'NAIA GIPERTONIIA U GORNORABOCHIKH GLUBOKIKH SHAKHT]

N. G. SAVENKOVA (Donetskii Nauchno-Issledovatel'skii Institut Gigieny Truda i Profzabolevanii, Donetsk, Ukrainian SSR) Vrachebnoe Delo, Oct. 1982, p. 112-115. In Russian. refs

## A83-17168

EVOLUTIONARY AND EXPERIMENTAL PRINCIPLES OF MUSCLE HYGIENE [EVOLIUTSIONNYE I EKSPERIMENTAL'NYE OSNOVY GIGIENY MYSHTS]

A. N. STUDITSKII (Akademii Nauk SSSR, Institut Evoliutsionnoi Morfologii i Ekologii Zhivotnykh, Moscow, USSR) Zhurnal Obshchei Biologii, vol. 43, Sept.-Oct. 1982, p. 604-621. In Russian. refs

The regulation mechanism of the development of specific form in humans is investigated in experiments with a model of working muscles - a muscular organ which develops in place of an excised muscle from minced muscle tissue, and which simulates the destruction of muscle fibers during work. In the regenerative (plastic) state, the muscle tissue undergoes a stimulating (trophic) effect from the nerve tissue and in turn exerts a trophic effect on the nerve tissue, which evokes a plastic (synaptogenic) activity. Muscle trophics is an important condition of stabilization and regulation of the specific form by means of physical exercise. Conditions required for the operation of the trophic (reparative) function of the muscle tissue are examined, including the morphogenic interaction of muscle organs, the mechanical factor (straining of the regenerating muscle), the anaerobic regime of the regenerating muscles following the operational destruction, and a positive emotional state. N.B.

## A83-17170

THE EFFECT OF SINUSOIDAL MODULATED CURRENTS ON THE CARDIORESPIRATORY SYSTEM AND THE PHYSICAL CAPACITY OF ATHLETES [VLIANIE SINUSOIDAL'NYKH MODULIROVANNYKH TOKOV NA KARDIORESPIRATORNIU SISTEMU I FIZICHESKUIU RABOTOSPOSOBNOST' SPORTSMENOV]

I. I. DOMBROVSKAIA (Tsentral'nyi Nauchno-Issledovatel'skii Institut Kurortologii i Fizioterapii, Moscow, USSR) Voprosy Kurortologii, Fizioterapii i Lechebnoi Fizicheskoi Kul'tury, Sept.-Oct. 1982, p. 33-35. In Russian. refs

## A83-17171

THE CHANGES IN CARDIAC ACTIVITY DURING PHYSICAL EXERCISES IN AN ATHLETIC ARENA AND SWIMMING POOL FOLLOWING PROLONGED ANTIORTHOSTATIC HYPOKINESIA /BASED ON BIOTELEMETRY DATA/ [OB IZMENENIIAKH SERDECHNOI DEIATEL'NOSTI PRI VYPOLNENII FIZICHESKIKH UPRAZHNENII V SPORTIVNOM ZALE I BASSEINE POSLE DLITEL'NOI ANTIORTOSTATICHESKOI GIPOKINEZII /PO DANNYM BIOTELEMETRII/]

B. M. FEDOROV, N. A. BELAIA, I. P. LEBEDEVA, and V. V. TKACHEV (Tsentral'nyi Nauchno-Issledovatel'skii Institut Kurortologii i Fizioterapii, Moscow, USSR) Voprosy Kurortologii, Fizioterapii i Lechebnoi Fizicheskoi Kul'tury, Sept.-Oct. 1982, p. 30-32. In Russian. refs

## A83-17172

PERICARDIAL MESSAGES AND THEIR EFFECT ON THE REHABILITATION THERAPY BY MEANS OF GRADED PHYSICAL LOADS OF PATIENTS WHO HAVE HAD A MYOCARDIAL INFARCTION [PERIKARDIAL'NYI MASSAZH I EGO VLIANIE PRI VOSSTANOVITEL'NOM LECHENII DOZIROVANNYMI FIZICHESKIMI NAGRUZKAMI BAL'NYKH, PERENESHKIH INFARKT MIOKARDA]

M. IU. AKHMEDZHANOV, N. P. LESHCHINSKAIA, V. V. ARKHANGELSKII, S. IA. GUZ, M. S. AFANASEVA, and B. A. SOKOLOV (Ialtinskii Nauchno-Issledovatel'skii Institut Fizicheskikh Metodov Lecheniia i Meditsinskoi Klimatologii, Yalta, Ukrainian SSR) Voprosy Kurortologii, Fizioterapii i Lechebnoi Fizicheskoi Kul'tury, Sept.-Oct. 1982, p. 21-23. In Russian. refs

## A83-17173

THE TOLERANCE TO PHYSICAL LOADS AMONG PATIENTS WITH ISCHEMIC HEART DISEASE AS A FUNCTION OF DIET AND THE TIME WHEN FOOD IS TAKEN [O TOLERANTNOSTI K FIZICHESKIM NAGRUZKAM U BOL'NYKH ISHEMICHESKOI BOLEZN'IU SERDTSA V ZAVISIMOSTI OT KHARAKTERA PISHCHI I VREMENI EE PRIEMA]

G. N. PROPASTIN, G. S. KOZLOV, E. A. ANTROPOV, and N. S. MOLOTKOVA (Iaroslavskii Meditsinskii Institut, Yaroslavl, USSR) Voprosy Kurortologii, Fizioterapii i Lechebnoi Fizicheskoi Kul'tury, Sept.-Oct. 1982, p. 18-21. In Russian. refs

## A83-17175

PHYSICAL EXERCISE AS A METHOD IN SUPPORT OF THERAPY [LECHEBNAIA FIZKUL'TURA KAK METOD PODDERZHIVAIUSHCHEI TERAPII]

V. N. MOSHKOV (Voprosy Kurortologii, Fizioterapii i Lechebnoi Fizicheskoi Kul'tury, Sept.-Oct. 1982, p. 1-5. In Russian.

## A83-17176

PREVENTION OF TOOTH DECAY AMONG SEAMAN [PROFILAKTIKA KARIESA ZUBOV U MORIAKOV]

V. F. CHERNYSH, V. D. SYCHEV, and N. M. ISHCHUK (Voenno-Meditsinskii Zhurnal, Oct. 1982, p. 42. In Russian.

A83-17177

SIGNIFICANCE OF THE MEASUREMENT OF COLLOIDAL-ONCOTIC AND HYDROSTATIC PRESSURES IN LUNG CAPILLARIES FOR THE DIAGNOSIS OF EDEMA OF THE LUNGS [ZNACHENIE IZMERENIIA KOLLOIDNO-ONKOTICHESKOGO I GIDROSTATICHESKOGO DAVLENIIA V LEGOCHNYKH KAPILLIARAKH DLIYA DIAGNOSTIKI OTEKA LEGKIKH]

I. V. SHASTIN, V. N. ALEKSANDROV, S. A. MARKIN, and A. I. POZIN Voenno-Meditsinskii Zhurnal, Oct. 1982, p. 67-69. In Russian. refs

A83-17178

PILOTS ARE TREATED AND REST HERE [ZDES' LECHATSIA I OTDYKHAIUT LETCHIKI]

IU. V. SHMELEV Voenno-Meditsinskii Zhurnal, Oct. 1982, p. 11-13. In Russian.

A83-17179

COMPUTER TOMOGRAPHY APPLIED TO THE STUDY OF INFLAMMATORY DISEASES OF THE BRAIN /A SURVEY OF THE LITERATURE/ [KOMP'YUTERNAIA TOMOGRAFIYA PRI VOSPALITEL'NYKH ZABOLEVANIYAKH MOZGA /OBZOR LITERATURY/]

M. IU. DOROFEEVA Zhurnal Neuropatologii i Psikiatrii im. S. S. Korsakova, vol. 82, no. 10, 1982, p. 1580-1583. In Russian. refs

A83-17193

DISEASES OF THE NERVOUS SYSTEM IN MINERS OF THE FAR NORTH AND PROBLEMS OF PREVENTION [ZABOLEVANIYA NERVOI SISTEMY SREDI GORNORABOCHIKH KRAINEGO SEVERA I VOPROSY PROFILAKTIKI]

A. G. IGNATEVA (Iakutskii Gosudarstvennyi Universitet, Yakutsk, USSR) Gigiena Truda i Professional'nye Zabolevaniia, Oct. 1982, p. 21-24. In Russian. refs

A83-17194

THE SIGNIFICANCE OF THE LEVEL OF GENERAL PHYSICAL WORK CAPACITY IN THE DEVELOPMENT OF FATIGUE IN WORKERS IN CONDITIONS OF OCCUPATIONAL HYPOKINESIA [ZNACHENIE UROVNIA OBSHCHEI FIZICHESKOI RABOTOSPOSOBNOSTI V RAZVITII UTOMLENNIIA RABOTAIUSHCHIKH V USLOVIIAKH PROFESSIONAL'NOI GIPOKINEZII]

L. V. ABOLIAN (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Gigiena Truda i Professional'nye Zabolevaniia, Oct. 1982, p. 14-18. In Russian. refs

A83-17197

THE USE OF A CONSTANT MAGNETIC FIELD IN THE TREATMENT OF DYSTROPHIES OF THE EXTREMITIES [PRIMENENIE POSTOYANNOGO MAGNITNOGO POLIA PRI LECHENII DISTROFICHESKIKH ZABOLEVANI KONECHNOSTEI]

V. M. LIRTSMAN, A. S. IMAMALIEV, and V. I. IAKUBOVICH (Tsentral'nyi Nauchno-Issledovatel'skii Institut Travmatologii i Ortopedii, Moscow, USSR) Sovetskaia Meditsina, no. 10, 1982, p. 115-117. In Russian. refs

A83-17198

THE EFFECT OF CLONIDINE ON THE CENTRAL AND RENAL HEMODYNAMICS OF INDIVIDUALS WITH HYPERTENSION DURING THE ADMINISTRATION OF ORTHOSTATIC PROBES [VLIANIE KLOFELINA NA TSENTRAL'NUIU POICHECHNUIU GEMODINAMIKU U BOL'NYKH GIPERTONICHESKOI BOLEZN'IU PRI PROVEDENII ORTOSTATICHESKOI PROBY]

S. M. MEILER, N. P. MOSKALENKO, and S. E. TASHKAN (Ministerstvo Meditsinskoi Promyshlennosti SSSR, Nauchno-Issledovatel'skii Institut po Biologicheskim Ispytaniyam Khimicheskikh Soedinenii, USSR) Sovetskaia Meditsina, no. 10, 1982, p. 100-102. In Russian. refs

The effects of clonidine on the orthostatic complications which arise during the treatment of hypertension are investigated by studying the central and renal hemodynamics of humans with varying stages of hypertension. Results show that clonidine decreases the incidence of orthostatic complications during the treatment of hypertension. In the vertical position, a greater decrease in the arterial pressure is found after treatment with clonidine due to a reduction in the orthostatic increase of the blood flow resistance. The decrease in the arterial pressure is not accompanied by a decrease in the functioning of the kidneys both in the horizontal and vertical positions. N.B.

A83-17199

MATHEMATICAL METHODS FOR OPTIMIZING TREATMENT AND DIAGNOSIS IN CARDIOLOGY /CURRENT STATUS AND FUTURE PROSPECTS/ [MATEMATICHESKIE METODY OPTIMIZATSII LECHENIIA I DIAGNOSTIKI V KARDIOLOGII /SOSTOIANIE I PERSPEKTIVY/]

IU. M. BALA (Voronezhskii Meditsinskii Institut, Voronezh, USSR) Sovetskaia Meditsina, no. 10, 1982, p. 87-91. In Russian. refs

A83-17200

THE REACTION OF THE HYPOPHYSIAL-ADRENAL SYSTEM TO EMOTIONAL STRESS IN PATIENTS WITH HYPERTENSION [REAKTSII GIPOFIZARNO-NADPOICHECHNIKOVOI SISTEMY U BOL'NYKH GIPERTONICHESKOI BOLEZN'IU NA EMOTSIONAL'NOE NAPIAZHENIE]

E. I. SOKOLOV, V. P. EMTSEVA, T. P. KHOVANSKAIA, I. E. SOFIEVA, and V. I. TRUBNIKOV (Moskovskii Meditsinskii Stomatologicheskii Institut, Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Sovetskaia Meditsina, no. 10, 1982, p. 16-20. In Russian. refs

The response of the hypophysial-adrenal system to emotional stress is studied in healthy individuals and in patients with hypertension by utilizing models of an individual standardized situation of intellectual activity in limited-time situations. The levels of ACTH and cortisol in the blood, and the excretion of catecholamines and 17-hydroxycorticosteroids (HCS) in the urine are determined both before and after subjection to emotional stress. Results show that healthy individuals and patients with hypertension exhibited different patterns in the levels of these hormones in the blood and the excretion of catecholamines and HCS in the urine. In addition, distinct increases in the initial levels of these hormones were observed in hypertensive patients as compared to healthy individuals. N.B.

A83-17205

THE PHOSPHOLIPID COMPOSITION OF BLOOD PLATELETS IN HEALTHY INDIVIDUALS AND IN INDIVIDUALS WITH DIABETES MELLITUS [FOSFOLIPIDNYI SOSTAV TROMBOTSITOV KROVI V NORME I PRI SAKHARNOM DIABETE]

T. S. SAATOV, A. A. ABIDOV, and I. M. ISAMITDINOVA (Akademiia Nauk Uzbekskoi SSR, Institut Biokhimii; Ministerstvo Zdravookhraneniia Uzbekskoi SSR, Institut Kraevoi Meditsiny, Tashkent, Uzbek SSR) Problemy Endokrinologii, vol. 28, Sept.-Oct. 1982, p. 3-6. In Russian. refs

## A83-17206

**A RARE CASE OF PULMONARY HYPERTENSION [REDKII SLUCHAI GIPERTONII MALOGO KRUGA KROVOOBRAZHCHENIIA]**

L. A. CHERKASSKII and T. V. GONCHAROVA (Semipalatinskii Meditsinskii Institut, Semipalatinsk, Kazakh SSR) Arkhiv Patologii, vol. 44, no. 10, 1982, p. 81-84. In Russian. refs

A case of primary pulmonary hypertension is reported where the condition resulted from a very unusual developmental defect of the pulmonary blood vessels. In accordance with the results of an autopsy, the defect involved focal angiomas, the anomalous location of the small veins in the adventitia of the malformed branches of the lung arteries, and the malformation of lesser arteries accompanied by the growth of the intima. This resulted in pulmonary hypertension, a widening of the pulmonary trunk lumen (with aortic hypoplasia), and a marked hypertrophy of the right ventricle. V.L.

## A83-17208

**REFRACTIVE THERMO- AND LASER KERATOPLASTY [REFRAKSIONNAIA TERMO- I LAZERKERATOPLASTIKA]**

A. P. CHETVERUKHIN, S. E. AVETISOV, and A. V. BOLSHUNOV (Ministerstvo Zdravookhraneniia SSSR, Vsesoiuznyi Nauchno-Issledovatel'skii Institut Glaznykh Boleznei, Moscow, USSR) Vestnik Oftal'mologii, Sept.-Oct. 1982, p. 67-69. In Russian. refs

## A83-17209

**THE INFORMATION VALUE OF AN ULTRASONIC EXAMINATION IN POSTTRAUMATIC ENDOPHTHALMITIS [INFORMATIVNOST' UL'TRAZVUKOVOGO ISSLEDOVANIYA PRI POSTTRAVMATICHESKOM ENDOFTAL'MITE]**

F. E. FRIDMAN, R. A. GUNDAROVA, G. D. MALIUTA, and A. M. IUZHAKOV (Moskovskii Nauchno-Issledovatel'skii Institut Glaznykh Boleznei, Moscow, USSR) Vestnik Oftal'mologii, Sept.-Oct. 1982, p. 49-51. In Russian. refs

## A83-17210

**POSSIBLE DEPENDENCE OF COMPLICATIONS OF INTRACAPSULAR CATARACT EXTRACTION ON THE PHASES OF THE MOON [VOZMOZHNAIA ZARISIMOST' OSLOZHNIENII PRI INTRAKAPSIULARNOI EKSTRAKTSII KATARAKTY OT RAZLICHNYKH FAZ LUNY]**

T. I. EROSHCHEVSKII, V. M. VINOKURENKO, and B. F. CHERKUNOV (Kuibyshevskii Meditsinskii Institut, Kuibyshev, USSR) Vestnik Oftal'mologii, Sept.-Oct. 1982, p. 44, 45. In Russian. refs

## A83-17212

**LASER TREATMENT OF OPEN-ANGLE GLAUCOMA: RANDOMIZED COMPARATIVE STUDIES - CYCLOTRABECULOSPASIS AND TRABECULOPLASTY [LAZERNOE LECHENIE PERVICHNOI OTKRYTOUGOL'NOI GLAUKOMY: RENDOMIZIROVANNYE SRAVNITEL'NYE ISSLEDOVANIYA - TSIKLOTRABEKULOSPAZIS I TRABEKULOPLASTIKA]**

M. M. KRASNOV, V. S. AKOPIAN, T. S. ILINA, and E. L. KAZAKOVA (Ministerstvo Zdravookhraneniia SSSR, Vsesoiuznyi Nauchno-Issledovatel'skii Institut Glaznykh Boleznei, Moscow, USSR) Vestnik Oftal'mologii, Sept.-Oct. 1982, p. 18-22. In Russian. refs

## A83-17213

**THE LONG-TERM RESULTS OF OPERATIONS FOR THE ULTRASONIC ACTIVATION OF TRABECULAE [OTDALENNYE REZUL'TATY OPERATSII UL'TRAZVUKOVOI AKTIVATSII TRABEKUL]**

M. N. EFIMOVA and M. B. KODZOV (Moskovskii Nauchno-Issledovatel'skii Institut Glaznykh Boleznei, Moscow, USSR) Vestnik Oftal'mologii, Sept.-Oct. 1982, p. 16-18. In Russian.

The results of antiglaucoma operations using ultrasonic treatments on the trabecular tissues of the eye in order to strengthen the filtration of the aqueous humor are evaluated for

116 patients between the ages of 24-80 years (average age 63.6 years). All patients were diagnosed as having open-angle glaucoma, at various stages, and were treated with ultrasonic waves at a wavelength of 6-8 microns and a frequency of 44 kHz for 8-10 sec. The long-term effects (4-16 months) of these operations were studied for 62 of the patients. It is found that the intraocular pressure decreased in 52% of these patients, primarily those with initial and developed stages of glaucoma, chiefly due to a substantial improvement of the backflow of the aqueous humor. N.B.

## A83-17215

**THE RESULTS OF FOCUSED AND PROJECTOR ULTRASONIC DOPPLER CARDIOVALVULOGRAPHY /A STUDY OF PATIENTS WITH PULMONARY NORMOTENSION AND HYPERTENSION/ [REZUL'TATY FOKUSIROVANNOI I PROZHEKTORNOI UL'TRAZVUKOVOI DOPPLER-KARDIOVAL'VULOGRAFII /ISSLEDOVANIE BOL'NYKH S LEGOCHNOI NORMO- I GIPERTENZIEI/]**

O. M. KRYNSKII, IU. M. BOBOK, B. E. MIKHALEV, and A. I. OPARIN (Voenno-Meditsinskaiia Akademiia; Vsesoiuznyi Nauchno-Issledovatel'skii Institut Tokov Vysokoi Chastoty, Leningrad, USSR) Kardiologiya, vol. 22, Oct. 1982, p. 103-106. In Russian. refs

## A83-17216

**CLINICAL AND EKG CRITERIA FOR DISORDERS OF THE CARDIAC RHYTHM IN THE WEAK SINUS NODE SYNDROME [KLINIKO-ELEKTROKARDIOGRAFICHESKIE KRITERII NARUCHENII RITMA SERDTSIA PRI SINDROME SLABOSTI SINUSOVOGO UZLA]**

M. A. KOROLEVA and G. V. GRUDTSYN (Tsentral'nyi Institut Usovershenstvovaniia Vrachey, Moscow, USSR) Kardiologiya, vol. 22, Oct. 1982, p. 94-98. In Russian. refs

## A83-17218

**SEVERAL METABOLIC EFFECTS OF A GLUCOSE-INSULIN-POTASSIUM MIXTURE ON PATIENTS WITH ACUTE MYOCARDIAL INFARCTIONS [NEKOTORYE METABOLICHESKIE EFFEKTY GLIUKOZO-INSULINO-KALIEVOI SMESI U BOL'NYKH OSTRYM INFARKTOM MIOKARDA]**

N. A. SYSOEVA, R. G. OGANOV (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR), and I. L. MIKHAILOVA Kardiologiya, vol. 22, Oct. 1982, p. 77-82. In Russian. refs

## A83-17221

**THE USE OF CORDARONE DURING ACUTE MYOCARDIAL INFARCTIONS [PRIMENENIE KORDARONA PRI OSTROM INFARKTE MIOKARDA]**

G. A. GOLDBERG (Novokuznetskii Institut Usovershenstvovaniia Vrachey, Novokuznetsk, USSR) and IU. I. NESTEROV (Tsentral'naia Gorodskaiia Bol'nitsa, Kemerovo, USSR) Kardiologiya, vol. 22, Oct. 1982, p. 107, 108. In Russian. refs

The effect of the antiarrhythmia drug cordarone on ventricular fibrillation during acute myocardial infarctions was investigated. Results show that during the course of treatment (3-3 days after hospitalization), the patients receiving cordarone exhibited a lower frequency of ventricular extrasystole, fibrillation arrhythmia, and atrial extrasystole than shown by the control group. In addition, the group of patients receiving cordarone had statistically significant decreases in the development of recurring myocardial infarction, as well as of delayed and common angina pectoris. No complications from the use of cordarone were observed. N.B.

## A83-17300

**CLINICAL AVIATION MEDICINE**

R. B. RAYMAN (USAF, Washington, DC) New York, Vantage Press, 1982. 252 p. refs \$12

A textbook is presented which focuses on the application of clinical medicine in the field of aviation medicine. The diseases most commonly seen by flight surgeons, as well as those diseases



of particular aeromedical significance, are examined in detail, although only those aspects of a disease and its treatment which have aeromedical significance and which the flight surgeon needs to consider when determining the aeromedical disposition of an airman are treated. Topics discussed include internal medicine, orthopedics, neurology, ophthalmology, otolaryngology, cardiology, urology, and psychiatry. Emphasis is placed upon the signs, symptoms, modes of therapy, and the prognoses of diseases, and what their significance is to flying safety. In addition, the side effects of commonly prescribed medications and how they can compromise flying safety are discussed. N.B.

#### A83-17328

##### VARIABILITY OF FIBER TYPE DISTRIBUTIONS WITHIN HUMAN MUSCLES

G. C. B. ELDER, K. BRADBURY, and R. ROBERTS (Dalhousie University, Halifax, Canada) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Dec. 1982, p. 1473-1480. Research supported by the Muscular Dystrophy Association of Canada. refs

#### A83-17331

##### PLASMA ELECTROLYTE CONTENT AND CONCENTRATION DURING TREADMILL EXERCISE IN HUMANS

J. E. WILKERSON, S. M. HORVATH, B. GUTIN, S. MOLNAR, and F. J. DIAZ (California, University, Santa Barbara, CA) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Dec. 1982, p. 1529-1539. refs (Contract AF-AFOSR-78-3534; NIH-AG-00073)

Venous plasma concentration and plasma contents of the ions Na(+), K(+), Cl(-), ionized calcium Ca(2+), and inorganic phosphorus P(i) were determined for male subjects performing 20 min of exercise at various submaximal velocities on a treadmill. Statistically significant linear increases in plasma concentrations of Na(+), K(+), and Cl(-) relative to exercise intensity were observed, with linear decreases in plasma contents of Na(+) and Cl(-) and linear increases in K(+) content. Plasma P(i) concentration decreased with increased P(i) content, with total Ca concentration elevated at the highest work loads. Total Ca increased linearly with exercise intensity and duration. Plasma H<sub>2</sub>O concentration and content decreased with exercise intensity, resulting in no change in electrolyte concentration per liter of H<sub>2</sub>O except at the highest exercise levels. These data suggest that changes in plasma volume and plasma H<sub>2</sub>O must be considered when postulating a role for electrolytes in the physiological response to exercise. C..

#### A83-17332

##### SWEAT COMPOSITION IN EXERCISE AND IN HEAT

T. VERDE, R. J. SHEPHARD, P. COREY, and R. MOORE (Toronto, University; Sunnybrook Hospital, Toronto, Canada) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Dec. 1982, p. 1540-1545. refs

Sweat samples were collected from the forearms of eight male subjects using light gauze pads applied for 20-min periods. The test conditions included (1) outdoor exercise, cool environment; (2) indoor exercise, normal room temperatures; and (3) sauna exposure. In all cases, Mg(2+) decreased as sweat flow increased, whereas Na(+), K(+), Ca(2+), and Cl(-) were independent of sweat flow rates after allowance for individual differences of sweat volume. Interindividual differences in sweat composition could not be explained in terms of differences in personal fitness. Sauna exposure yielded sweat with higher Mg(2+) and Ca(2+) contents, compared with exercise; however, Na(+), K(+), and Cl(-) were similar for the three experimental conditions. The results obtained are best explained in terms of an active regulation of sweat composition. V.L.

#### A83-17335

##### AUTONOMIC CONTRIBUTION TO HEART RATE RECOVERY FROM EXERCISE IN HUMANS

W. M. SAVIN, D. M. DAVIDSON, and W. L. HASKELL (Stanford University, Palo Alto, CA) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Dec. 1982, p. 1572-1575. refs

Observations are made of heart rate after peak treadmill exercise in six men after each had received drugs producing beta-sympathetic blockade, parasympathetic blockade, and double blockade then had received no drugs. The data are seen as suggesting that the exponential character of cardiodeceleration is intrinsic to the circulation and is modulated by sympathetic and parasympathetic activity. The most striking feature of the study is considered to be the exponential decline of the heart rate after peak dynamic exercise under all treatment conditions. This shows that the postexercise exponential decline in heart rate, rather than being dependent on autonomic control, is an intrinsic property of the intact circulation. It is believed that sympathetic withdrawal contributes more to heart rate recovery soon after peak exercise cessation, with parasympathetic activation playing a greater role later in recovery at lower heart rates. C.R.

#### A83-17337

##### COMPARISON OF HEMODYNAMIC RESPONSES TO STATIC AND DYNAMIC EXERCISE

G. R. BEZUCHA, M. C. LENSER, P. G. HANSON, and F. J. NAGLE (Wisconsin, University, Madison, WI) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Dec. 1982, p. 1589-1593. refs

The study seeks to determine the interaction between cardiac output and total peripheral resistance in static and dynamic exercise, and toward this end the cardiovascular responses to static exercise in a relatively large muscle group, namely the quadriceps in leg extension are investigated. In addition, the static leg extension responses are compared with those observed during static-dynamic exercise (one-arm cranking) and dynamic exercise (two-leg cycling) where metabolic costs are similar. With 30% leg extension, a significant increase in mean arterial pressure occurs, mediated primarily by an increase in cardiac output. One-arm cranking and two-leg cycling at similar relative O<sub>2</sub> uptake demands are found to result in nearly identical increases in mean arterial pressure owing to the different contributions of cardiac output and total peripheral response. Cardiac output and the arteriovenous O<sub>2</sub> difference are found to vary as a function of O<sub>2</sub> uptake regardless of the mode of exercise (static or dynamic). C.R.

#### A83-17338

##### FATE OF EXOGENOUS GLUCOSE DURING EXERCISE OF DIFFERENT INTENSITIES IN HUMANS

F. PIRNAY, J. M. CRIELAARD, N. PALLIKARAKIS, M. LACROIX, F. MOSORA, G. KRZENTOWSKI, A. S. LUYCKYX, and P. J. LEFEBVRE (Liege, Universite, Liege, Belgium) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Dec. 1982, p. 1620-1624. refs

#### A83-17695

##### A METHOD FOR THE QUANTITATIVE EVALUATION OF THE CONTRACTILE FUNCTION OF THE MYOCARDIUM [METOD KOLICHESTVENNOI OTSENKI SOKRATITEL'NOI FUNKTSII MIOKARDA]

IU. N. SHISHMAREV, A. S. LOKTEV, V. A. SILIN, and I. V. MALYSHEV *Voenno-Meditsinskii Zhurnal*, Nov. 1982, p. 26-29. In Russian. refs

A method is presented for quantitatively determining the contractile functions of the myocardium of the heart ventricles on the basis of analyses of the unipolar EKG responses using specified criteria. For a group of 117 patients, the heart and major arteries were examined using cineangiography and EKG, and for a portion of the group, the diameter of the wall of the left ventricle of the heart during the diastole period was determined by echocardiography. The dependence between the amount of work of the heart ventricles, the loss of blood during the outflow of the



beat volume, and the amplitude of the peaks of the ventricular formation in the chest unipolar responses of the EKG is determined and is found to exhibit a definite pattern for the corresponding work of the ventricles. The criteria representing these relationships are analyzed and presented in a table. N.B.

## A83-17696

**THE LONG-TERM CONSEQUENCES OF COMBINED RADIATION DAMAGE [OTDALENNYE POSLEDSTVIA SOCHETANNYKH RADIATIONNYKH PORAZHENII]**

I. IA. VASILENKO Voenno-Meditsinskii Zhurnal, Nov. 1982, p. 29-32. In Russian. refs

A review is presented of the long-term damage to humans and animals of the combined effects of general external gamma-irradiation and the internal effects of the products of atomic fission. Attention is focused on clinical studies of dogs which analyzed the effects of precise doses of radiation over time that were administered externally and internally. It is shown that the dogs receiving moderate doses of radiation recovered 2-3 months after irradiation, and that after the clinical recovery, two distinct periods can be identified. It is concluded that for the long-term prophylaxis of the radiation damage, the functions of the thyroid gland must be normalized so that it can act on the functions of other organs and systems, raise the immunological resistance of the body, and lower the incidence of blastomogenic effects.

N.B.

## A83-17698

**THE PECULIARITIES OF MEDICAL SUPPORT FOR HELICOPTER FLIGHTS [OSOBENOSTI MEDITSINSKOGO OBESPECHENIIA POLETOV NA VERTOLETAKH]**

V. I. KOPANEV and V. A. EGOROV Voenno-Meditsinskii Zhurnal, Nov. 1982, p. 42, 43. In Russian.

Medical aspects of the effects on humans of helicopter flights are examined, and several recommendations concerning the medical support and the preparation of helicopter flight crews are presented. Topics discussed include the physiological and hygienic characteristics of the habitability conditions during helicopter flights, and the psychological and physiological peculiarities of the activities of the helicopter flight crews. Among the recommendations proposed for improving the health of helicopter flight crews are a specific series of exercises designed to lessen the effects of helicopter flights, physiotherapy to prevent the harmful effects of dynamic factors, and preliminary training on helicopter models to acquaint the flight crews with the correct procedures to be followed during the flights.

N.B.

## A83-17746

**SENSITIVITY TO SPATIOTEMPORAL COLOUR CONTRAST IN THE PERIPHERAL VISUAL FIELD**

C. NOORLANDER, J. J. KOENDERINK, R. J. D. OUDEN, and B. W. EDENS (Utrecht, Rijksuniversiteit, Utrecht, Netherlands) Vision Research, vol. 23, no. 1, 1983, p. 1-11. refs

Contrast detection thresholds for spatiotemporal color modulation were determined at several retinal locations. Color discrimination is studied for red-green modulation of a yellow field and for yellow-blue modulation of a white field. For constant target size color vision deteriorates if the stimulus is moved away from the fovea, but if the shift is combined with a suitable enlargement of the target size color discrimination at the periphery is comparable to that at the fovea. No retinal location along the horizontal meridian which was red-green or yellow-blue color blind could be found. Chromatic bars were detected in the nasal peripheral retina at eccentricities of up to at least 50 deg, temporal color contrast was perceptible at nasal eccentricities of up to at least 90 deg.

(Author)

## A83-17747

**THE ACCURACY OF BINOCULAR VERGENCE FOR PERIPHERAL STIMULI**

E. L. FRANCIS and D. A. OWENS (Franklin and Marshall College, Lancaster, PA) Vision Research, vol. 23, no. 1, 1983, p. 13-19. refs

Two experiments were conducted to investigate the roles of dark vergence and retinal eccentricity as factors influencing binocular vergence responses. A nonius alignment technique was used to measure vergence responses in total darkness (dark vergence) and for dim binocular stimuli presented at retinal eccentricities ranging from 2 deg to 8 deg over distances ranging from 28.5 to 342 cm. The results indicate that vergence was progressively less accurate with stimuli at increasing retinal eccentricities, and that errors of fixation were biased toward the individual's dark vergence position. The hypothesis that dark vergence represents the functional resting state of the vergence system which influences oculomotor fusional responses under a variety of conditions is discussed.

(Author)

## A83-17748

**THE EFFECTS OF AGE ON NORMAL SACCADIC CHARACTERISTICS AND THEIR VARIABILITY**

L. A. ABEL, B. T. TROOST, and L. F. DELL OSSO (U.S. Veterans Administration Medical Center; Case Western Reserve University, Cleveland, OH) Vision Research, vol. 23, no. 1, 1983, p. 33-37. Research supported by the Health Research and Services Foundation. refs

Age effects on human saccadic eye movements were tested with infrared reflectance oculography in 34 subjects. In contrast to a prior report, only a slight non-significant change was observed in saccadic velocity and duration. An increase in saccadic latency comparable to that found in several previous reports was observed, however. All parameters showed considerable intersubject variability for both age groups. Decreased velocities or increased durations outside of these normal, broad ranges should be regarded as pathological for all subjects; they are not physiological effects of the aging process.

(Author)

## A83-17749

**EXTRAPOLATION OF MOTION PATH IN HUMAN VISUAL PERCEPTION**

V. S. RAMACHANDRAN (California, University, Irvine, CA) and S. M. ANSTIS (York University, Downsview, Ontario, Canada) Vision Research, vol. 23, no. 1, 1983, p. 83-85. Research supported by the Alfred P. Sloan Foundation; Natural Sciences and Engineering Research Council of Canada refs

(Contract NSERC-A-0260)

Context-dependent effects in apparent motion which cannot be predicted simply from the interactions of two spots are described. By way of example, consideration is given to an equilateral triangle of three dots, with A at the apex and B and C at the base corners. It is pointed out that flashing first B and then C gives horizontal apparent motion from B to C, both to a human observer and to a motion detector. Flashing first B then A and then C gives a V-shaped motion path from B up to A and from A down to C. It is noted that this preempts the apparent motion from B to C, which has now disappeared. The motion 'link' from B has now been used up by A and is no longer available to link up B with C, even though the time interval between B and C is not changed. It is thought possible that the link between B and C might be inhibited at an early level or else vetoed later by a higher level decision process.

C.R.

## A83-17750

**CONTRAST SENSITIVITY - PSYCHOPHYSICAL AND EVOKED POTENTIAL METHODS COMPARED**

M. W. CANNON, JR. (USAF, Aviation Vision Laboratory, Wright-Patterson AFB, OH) Vision Research, vol. 23, no. 1, 1983, p. 87-95. USAF-supported research. refs

Contrast sensitivity function derived from steady state evoked potential thresholds show high correlation with psychophysically derived threshold contrast sensitivity functions. This correlation

holds as flicker rate, type of flicker, optical correction and visibility conditions are changed over a substantial range, provided that VEP and psychophysical data are recorded under the same experimental conditions. (Author)

#### A83-17795

##### COOPERATIVE DEOXYGENATION OF HAEMOGLOBIN - ASYMMETRY OF BINDING AND SUBUNIT DIFFERENCES

L. PELLER (California, University, San Francisco, CA) *Nature*, vol. 300, Dec. 16, 1982, p. 661, 662. refs  
(Contract NSF PCM-80-22006)

Oxygen uptake by the blood in the lungs of a resting human brings the level of saturation of haemoglobin from about 70% to 97%. The recourse to this upper portion of the oxygen binding curve is reflected in an asymmetry of the isotherm which is frequently reported, but which has not been accorded any physiological role. This asymmetry is responsible for a more pronounced cooperativity of the deoxygenation at nearly complete saturation than that displayed in the typical sigmoidal pattern of loading at low oxygen tensions. Such behaviour is viewed here as a consequence of, and a possible rationalization for, the presence of two similar but distinct types of subunit in the haemoglobin tetramer. (Author)

#### A83-18186

##### ELECTROGUSTOMETRIC INVESTIGATIONS DURING MANNED SPACE FLIGHT

S. BARANSKI, J. KUBICZKOWA, A. PIORKO, F. SKIBNIEWSKI, I. I. BRIANOV, E. P. MILOVA, M. V. NEFEDOVA, and I. J. IAKOVLEVA (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland; Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR) *Aviation, Space, and Environmental Medicine*, vol. 54, Jan. 1983, p. 1-5. refs

The results of experiments undertaken in order to investigate the threshold susceptibility of the taste receptors of cosmonauts on the Soyuz 30 and 31 spacecraft during prolonged weightlessness are presented. The taste experiments were carried out using an electrogustometer, and block diagrams of the electrogustometer and of the digital circuit are provided. The results of experiments of the taste perception threshold of the cosmonauts before launch, during weightlessness, and after return to earth are examined. N.B.

#### A83-18190

##### METABOLIC EFFECTS OF FACIAL COOLING IN EXERCISE

C. E. RIGGS, JR., D. J. JOHNSON, R. D. KILGOUR, and B. J. KONOPKA (Florida State University, Tallahassee, FL) *Aviation, Space, and Environmental Medicine*, vol. 54, Jan. 1983, p. 22-26. refs

Metabolic responses to facial cooling during prolonged exercise was investigated in five male subjects. Exercise on a bicycle ergometer at 50 rpm for 1 h at 60% maximal heart rate was performed twice, once with cold wind (10 C, 6.5 m/s) and once without. Resting experiments were conducted under identical conditions. Facial cooling apparently had no effect on plasma FFA or glucose concentration during exercise but did, however, result in significantly ( $p$  less than 0.05) greater fat utilization, as indicated by lower respiratory exchange ratios at 60 min of exercise. The respiratory exchange ratio, blood lactate concentration, oxygen consumption, and estimated myocardial oxygen consumption at 5 min of exercise were higher with facial cooling. The results suggest that metabolic changes occur with facial cooling that are related to a general thermoregulatory response and that the stress of exercise is greater with facial cooling. (Author)

#### A83-18191

##### DOES HEAT ACCLIMATION LOWER THE RATE OF METABOLISM ELICITED BY MUSCULAR EXERCISE

M. N. SAWKA, K. B. PANDOLF, B. A. AVELLINI, and Y. SHAPIRO (U.S. Army, Research Institute of Environmental Medicine, Natick, MA) *Aviation, Space, and Environmental Medicine*, vol. 54, Jan. 1983, p. 27-31. refs

The effect of heat accumulation on the rate of metabolism elicited by muscular exercise is investigated, and the influence of season of year and subject gender on the effect of heat acclimation on the rate of metabolisms during exercise is studied. Volunteers performed standardized treadmill walks in hot (40 C, 30% rh or 49 C, 20% rh) and cool (20 C, 40% rh) environments immediately before and after heat acclimation. Results show that heat acclimation lowers the rate of metabolism elicited by exercise by approximately 3% and 5% in a hot and cool environment, respectively. Season of year and subject gender are found not to have a significant effect on these results. It is concluded that the lowered rate of metabolism elicited by exercise probably contributes to the decreased body temperature responses reported to occur during exercise after heat acclimation, although the physiological mechanisms responsible for this decreased rate of metabolism remain unclear. N.B.

#### A83-18192

##### THE DYNAMICS OF VERTICAL EYE MOVEMENTS IN NORMAL HUMAN SUBJECTS

R. W. BALOH, L. RICHMAN, R. D. YEE, and V. HONRUBIA (California, University, Los Angeles, CA) *Aviation, Space, and Environmental Medicine*, vol. 54, Jan. 1983, p. 32-38. refs  
(Contract NIH-NS-09823)

The dynamics of horizontal and vertical slow eye movements (vestibular, optokinetic, pursuit, and visual-vestibular) were investigated in 10 normal human subjects. Results show several differences between horizontal and vertical eye movements. The time constant of vertical post-rotatory nystagmus (PRN) was determined to be, on average, 50% as long as the time constant of horizontal PRN; and the mean phase lead of per-rotatory nystagmus during low-frequency sinusoidal rotation in the vertical plane was found to be approximately twice the mean phase lead of per-rotatory nystagmus at the same frequency in the horizontal plane. Vertical optokinetic after-nystagmus (OKAN) was minimal compared to horizontal OKAN, and asymmetries in the dynamics of vertical eye movements were also observed. The mean time constant of PRN with upward slow phases was consistently longer than the mean time constant of PRN with downward slow phases, and vertical OKAN only occurred when the optokinetic stimulus moved upward. In addition, upward pursuit was found to be better than downward pursuit, while upward slow phases of vestibular nystagmus were poorly inhibited with fixation while downward slow phases were normally inhibited. N.B.

#### A83-18195

##### ISOMETRIC MUSCLE FORCE RESPONSE OF THE HUMAN LOWER LIMB

A. E. ENGIN (Ohio State University, Columbus, OH) *Aviation, Space, and Environmental Medicine*, vol. 54, Jan. 1983, p. 52-57. USAF-supported research. refs

The isometric muscle force response of the human lower limb when the leg is subjected to various external forces applied on the knee and ankle joints is investigated. Experiments were conducted on three male and three female subjects in order to determine their isometric muscle resistance against external forces trying to dislodge their lower limbs from several initial configurations. In addition, the isometric muscle resistances of the subjects were determined when the lower limbs were dislodged from the initial stowed position. It is shown that, although there are intra and inter-subject variations for the maximum values of the resistive muscle forces of the lower limb, some trends are present in the behavior of their magnitudes. Among other results it was found that the maximum magnitude of force required to dislodge the leg is generally greater for the knee flexed than for the knee locked, and the ratios of these forces tend to decrease as the subject's

limit is approached in lateral dislodgement for any given position of the upper leg in relation to the torso. N.B.

#### A83-18196

##### ACCELERATION-INDUCED VENTRICULAR TACHYCARDIA IN ASYMPTOMATIC MEN - RELATION TO MITRAL VALVE PROLAPSE

J. E. WHINNERY (USAF, School of Aerospace Medicine, Brooks AFB, TX) Aviation, Space, and Environmental Medicine, vol. 54, Jan. 1983, p. 58-64. refs

The findings in 15 apparently healthy asymptomatic males who had short runs of ventricular tachycardia during +Gz acceleration stress are presented. Echocardiograms were given in order to screen the subjects for possible mitral valve prolapse, but none was detected, except in two subjects already being treated for this condition. It was found that the episodes of ventricular tachycardia occurred in association with very stressful +Gz exposures on a human centrifuge. Anthropomorphic and physiologic response parameters show that these subjects were under unusually high stress when they had the episodes of ventricular tachycardia. The multistress environment of the advanced fighter aircraft represents a summation of factors that have been associated with significant dysrhythmias, such as ventricular tachycardia. It is concluded that in-flight episodes of ventricular tachycardia may occur frequently in asymptomatic, apparently healthy aircrewmembers with completely normal aeromedical evaluations. N.B.

#### A83-18197

##### HYPERTENSION AND ORTHOSTATIC HYPOTENSION IN APPLICANTS FOR FLYING TRAINING AND AIRCREW

H. S. FUCHS (Giessen, Universitaet, Giessen, West Germany) Aviation, Space, and Environmental Medicine, vol. 54, Jan. 1983, p. 65-68. refs

The relationship of hypertension and fitness in aircrew members is examined. Two types of hypertension, labile hypertension and vascular hypertension are discussed in relation to blood pressure standards in aircrew members. Also considered are blood pressure evaluations for flying duties, the treatment of aircrew showing hypertension, and orthostatic hypotension. N.B.

#### A83-18198

##### MEASUREMENT OF SCOLIOSIS BY ORTHOPEDIC SURGEONS AND RADIOLOGISTS

M. S. WILSON, J. STOCKWELL, and M. G. LEEDY (USAF, Clinic SGP, McClellan AFB; California, University, Davis, CA) Aviation, Space, and Environmental Medicine, vol. 54, Jan. 1983, p. 69-71. refs

Minimum medical standards for USAF flying personnel have been compiled in Air Force Regulation 160-43. This regulation specifies the maximum allowable amount of scoliosis, but does not specify who should read the X-ray film to determine, using the Cobb method, the degree of curvature in scoliotic individuals. In the present study, an X-ray of an individual with mild scoliosis was sent to departments of radiology and orthopedics at major U.S. Armed Forces Medical Centers. Although the mean estimated degree of curvature was the same for both the orthopedists and the radiologists, the variance in the radiologists' replies was considerably higher than normally expected. It is, therefore, recommended that scoliosis films of individuals being screened for flying duties should be reviewed by a qualified orthopedic surgeon. (Author)

#### A83-18331

##### PSYCHOTHERAPIES AND CHEMOTHERAPIES IN AERONAUTIC PSYCHOPATHOLOGY - INDICATIONS, CONTRAINDICATIONS, AND OCCURRENCES INVOLVING CAPACITY [PSYCHOTHERAPIES ET CHIMIOETHERAPIES EN PSYCHOPATHOLOGIE AERONAUTIQUE]

C. J. BLANC Medecine Aeronautique et Spatiale, vol. 21, 3rd Quarter, 1982, p. 140-146. In French. refs

A review is presented concerning several assertions and propositions relating to different methods for aeronautical

psychotherapies. Among the assertions, based on clinical practice, are: classical therapies should be varied when applied to aeronautical situations and for each type of personnel. Classical types of therapies, such as the use of tricyclic antidepressants, often present risks of special types of side effects that particularly affect flight personnel. Long-term therapies using psychoactive medications should be adjusted to the personalities of the patients, and should be used with moderation and flexibility. The interpretation of mixed treatments is not accessible to a multidimensional analysis capable of determining the interactions and the feedback of each specific treatment. N.B.

#### A83-18334

##### THE THERAPEUTIC ASPECT OF MILITARY PILOT CERTIFICATION [ASPECT THERAPEUTIQUE DE L'EXPERTISE DU P.N. MILITAIRE]

J.-C. HADNI, J.-R. GALLE-TESSONNEAU, J.-C. DUBOUISS-BONNEFOND, and F. MISSENARD Medecine Aeronautique et Spatiale, vol. 21, 3rd Quarter, 1982, p. 161-164. In French. refs

Four case histories are reviewed to examine the usefulness of a therapist for a military pilot, noting that an antipathy nominally exists in the pilot for doctors, who can rule on flight qualification. One case involves allowing a pilot who experienced depression upon entrance in the French air force to obtain a medical discharge, which was an honorable way out. The therapist is also shown to be able to aid a pilot toward acceptance of limited flight status or removal from the flight status completely, either permanently or temporarily. Few cases have been observed where the actual debility of the pilot has taken on significant pathologic or neurological symptoms. A pilot who had previously been involved in a mid-air collision, surviving without injury, became anxious while flying patrols. A two month relief from flight duty allowed the anxiety to diminish, and the pilot was returned to a less demanding flight task. Finally, a case is cited wherein a navigator of substantial experience demanded to be removed from the flight line for a period of time in protest of military inefficiencies and underutilization of equipment. The man returned to duty after the suspension period to continue his career. M.S.K.

#### A83-18335

##### THE PSYCHIATRIC POINT OF VIEW ON PILOT HEADACHES [POINT DE VUE DU PSYCHIATRE SUR LES CEPHALES DE L'AVIATEUR]

J. C. HADNI, B. RYCKELYNCK, J. R. GALLE-TESSONNEAU, and J. C. DUBOUISS-BONNEFOND Medecine Aeronautique et Spatiale, vol. 21, 3rd Quarter, 1982, p. 164-169. In French.

Pilot headaches arise from long demands on attention, excessive workload, the nature of military tasks, and from the intrusion of concerns from a pilot's personal life into the professional life. Additionally, rapid accelerations impose physiological stresses on the body and its homeostatic functions. The results of clinical EEG trials for various headaches experienced by pilots are reported. A broken engagement brought on the onset of migraines, as did disappointments in promotions, adoption proceedings for an infant, and an occasion of attending a large gathering of reserve officers. In all cases, the EEG was normal. The observation of atrocities committed by rebels in a foreign land also caused the onset of head pain, as did a fear of flying in an experienced aviator. It is concluded that pilots will frequently express physical symptoms for what are psychological problems. M.S.K.

**A83-18336****PILOT DEAFNESS - STATISTICAL STUDY OF MILITARY PILOT HEARING [LA SURDITE DE L'AVIATEUR - ETUDE STATISTIQUE DE L'AUDITION DU PERSONNEL NAVIGANT DE L'ARMEE DE L'AIR]**

H. LIENHART (Hopitaux des Armees; Centre Principal d'Expertise Medicale du Personnel Navigant, Paris, France) and J. NATHIE (Centre d'Etudes et de Recherches de Medecine Aerospatiale, Paris, France) *Medecine Aeronautique et Spatiale*, vol. 21, 3rd Quarter, 1982, p. 170-174. In French.

The results of a statistical study of hearing loss in military pilots are presented, with attention given to age, length of exposure, professional rating, flight hours, and bilaterality of the loss. A total of 1992 pilot ears and 1732 reference ears formed the data base, with all subjects exhibiting some deafness from purely neuro-sensorial sources. The tests comprised tonal audiometry, yielding 42 responses per subject for a total of 78,200 data points. A median population value was derived, revealing that the hearing loss occurred independently of the side of the head. Personnel of age 45 yr. experienced a loss centered around 4000 Hz, while overall the susceptibility was found to be highly individualized. It is noted that over 42.14 percent of French air force pilots can claim hearing loss indemnities. M.S.K.

**A83-18337****STATISTICAL DATA AND THE SOUND ENVIRONMENT OF AIR FORCE AIRCREWS [DONNEES STATISTIQUES ET ENVIRONNEMENT SONORE DU PERSONNEL NAVIGANT DE L'ARMEE DE L'AIR]**

H. LIENHART (Centre Principal d'Expertise Medicale du Personnel Navigant, Paris, France), J. P. HERNANDEZ-MARTINEZ (Service de Sante des Armees, Paris, France), J. NATHIE (Centre d'Etudes et de Recherches de Medecine Aerospatiale, Paris, France), and M. BATAILLE *Medecine Aeronautique et Spatiale*, vol. 21, 3rd Quarter, 1982, p. 175-178. In French.

Measures of the noise level of the sound environment of fighter pilots in the French Air Force are determined both on ground and during flying. It is found that these personnel are exposed to noise levels on the order of 95 dB, and the precise origin of the sound trauma risk is identified. The risk presented by activities on the ground (life on base, the squadron areas) is negligible. The risk is connected not with the air where the fighter pilot is protected, but it lies in the zone of aeronautic activity where the pilot is not protected. This risk can be limited to a significant extent by the utilization of individual protection using ear plugs. N.B.

**A83-18338****THE PROBLEM OF PRESBYOPIA IN PILOTS AND ITS CORRECTION WITH EYEGLASSES [LE PROBLEME DE LA PRESBYTIE CHEZ LE PERSONNEL NAVIGANT ET SA CORRECTION PAR LES VERRES PROGRESSIFS]**

J. P. BOISSIN, C. HURIER, E. LAFONTAINE, J. LAVERNEHE, and J. MUR *Medecine Aeronautique et Spatiale*, vol. 21, 3rd Quarter, 1982, p. 179-184. In French.

The results of an experiment of pilots wearing eyeglasses to compensate for presbyopia are reported. Attention was given to the quality of vision to the front and to sides, the quality of perception of the exterior of the cabin with regard to static objects, and distance estimation for exterior depths. The tests were run with pilots at least 53 years old and navigators at least 55 years old. The subjects viewed objects in different positions relative to the visual axis, replying with 'good', 'medium', or 'bad' to visual presentations. Additional responses were taken to assess the comfort of wearing the glasses. It was found that the eyeglasses were effective for near vision, and that pilots wear them only when needed. M.S.K.

**A83-18340****THE LIPIDIC BALANCE OF TECHNICAL FLIGHT PERSONNEL BETWEEN 50 AND 55 YEARS OLD IN COMMERCIAL AND CIVIL AVIATION [BILAN LIPIDIQUE DU PERSONNEL NAVIGANT TECHNIQUE DE L'AERONAUTIQUE CIVILE ET COMMERCIALE ENTRE 50 ET 55 ANS]**

L. ABBAS, G. BELLANGER (Compagnie Nationale Air France, Service de Medecine du Travail, Orly-Aerogare, Val-de-Marne, France), J. FUCHEZ, and M. CANTEGRIL (Compagnie Nationale Air France, Service de Medecine du Travail, Roissy, Val-d'Oise, France) *Medecine Aeronautique et Spatiale*, vol. 21, 3rd Quarter, 1982, p. 194-198. In French. refs

A total of 170 pilots over the age of 50 who were applying for certification for new aircraft were studied for lipid levels, cholesterol levels, and triglyceride levels over an 11 yr period. Additionally, the cause of death, when determined, was considered. It was found that 45 percent exhibited hyperlipidemia, 22 percent had isolated hypercholesterolemia, 9 percent displayed hypertriglyceridemia, and 14 percent had a mixed hyperlipidemia. The cholesterol excess percentages were far higher than results obtained in studies of the general population and of miners. A correlation was determined between the high lipid levels and a diet which included frequent ingestion of greasy food, especially saturated meat acids. Studies are cited to demonstrate that the restricted intake of fats and cigarettes can lead to significant elongation of life. M.S.K.

**A83-18509****BIOMECHANICAL ASPECTS OF THE FRACTURE RESISTANCE OF THE VERTEBRAL COLUMN OF HUMANS UNDER IMPACT OVERLOADS IN THE HEAD-PELVIS DIRECTION [BIOMEKHANICHESKIE ASPEKTY SOPROTVIYAEMOSTI RAZRUSHENIIU POZVONOCHNIKA CHELOVEKA PRI VOZDESITVII UDARNYKH PEREGRUZOK GOLOVA-TAZ]**

G. P. STUPAKOV, V. A. ELIVANOV, A. P. KOZLOVSKII, V. S. KAZEIKIN, and V. V. KOROLEV *Mekhanika Kompozitnykh Materialov*, Nov.-Dec. 1982, p. 1067-1071. In Russian.

Impact tests were carried out on sections of vertebra columns taken from the bodies of males that had died at 20-50 years of age from causes that do not affect the skeletal system. The minimum overloads resulting in fracture varied from 14 to 47 units in accordance with the normal distribution law. It is shown that the principal biometric indices accounting for this variance are the volume contents of mineral substances in the vertebra, the vertebra anthropometric characteristics, and the age and mass of the body. By including the biometric parameters in the multiple regression equation, a close correlation has been obtained with the minimum overload leading to injury. V.L.

**A83-18970****MATURATION OF POTENTIALS EVOKED BY SPATIALLY STRUCTURED STIMULI AND SENSITIVITY OF THE VISUAL SYSTEM TO DEPRIVATION [SOZREVANIE VYZVANNYKH POTENTIALOV NA PROSTRANSTVENNO-STRUKTURIROVANNYE STIMULY I CHUVSTVITEL'NOST' ZRITEL'NOI SISTEMY K DEPRIVATSII]**

N. N. ZISLINA (Akademiia Pedagogicheskikh Nauk SSSR, Moscow, USSR) *Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 32, Sept.-Oct. 1982, p. 925-931. In Russian. refs

**A83-18974****A NEW APPROACH TO THE QUANTITATIVE EVALUATION OF REFLEX VESTIBULAR NYSTAGMUS [NOVYI PODKHOD K KOLICHESTVENNOI OTSENKE REFLEKTORNOGO VESTIBULIARNOGO NISTAGMA]**

I. A. SKLIUT, S. G. TSEMAKHOV, and E. A. TURETSKII (Belorusskii Nauchno-Issledovatel'skii Institut Neurologii, Neirokhirurgii i Fizioterapii, Minsk, Belorussian SSR) *Zhurnal Ushnykh, Nosovykh i Gorlovnykh Boleznii*, Sept.-Oct. 1982, p. 11-18. In Russian. refs

A method is developed for evaluating the reflex activity of the vestibular system based on its neurodynamic mobility (functional reactivity). Differential caloric stimulation tests at temperatures of

35, 30, 25, and 20 C were carried out for 23 healthy individuals and 50 patients with Meniere's disease. The reflex activity of the vestibular system was calculated according to the changes in the frequency of nystagmus during the transition from a lesser to a greater intensity stimuli. A comparison of the absolute nystagmus frequency indices showed a difference between the normal individuals and the patients in 32 percent of the cases. It is concluded that the asymmetry of the vestibular activity is unstable and changes according to the intensity of the stimulus. N.B.

## A83-18975

**AN INVESTIGATION OF THE EFFECTIVENESS OF MOTION SICKNESS DRUGS BY THE METHOD OF DISPERSION ANALYSIS [IZUCHENIE EFFEKTIVNOSTI PROTIVOUKACHIVAIUSHCHIKH SREDSTV METODOM DISPERSIONNOGO ANALIZA]**

O. IA. PLEPIS, V. I. IUNKEROV, and L. A. GLAZNIKOV (Voenno-Meditsinskaya Akademiya, Leningrad, USSR) Zhurnal Ushnykh, Nosovykh i Gorlovykh Boleznii, Sept.-Oct. 1982, p. 22-26. In Russian. refs

The vestibulo-vegetative responses to Coriolis acceleration and shaking were studied in humans using tetrapolar rheography (Kubichek, 1966), EKG, and rheoencephalography recorded at the frontal-mastoid lead. Dispersion analysis was used to evaluate the pharmacological activity of various drugs for decreasing the severity of motion sickness. Results show that repeated doses of the drug AG-139 were the most effective treatment for increasing the resistance of the vestibular analyzer to Coriolis acceleration, while a single dose of AG-98 was the most effective against shaking. N.B.

## A83-18976

**GRADATIONS OF SEVERITY IN THE CONDITION OF PATIENTS WITH CRANIOCEREBRAL INJURIES AND UNIFIED CRITERIA FOR THEIR DETERMINATION [GRADATSII TIAZHESTI SOSTOIANIIA POSTRAZDAVSHIKH S CHEREPNO-MOZGOVOI TRAVMOI I UNIFITSIROVANNYE KRITERII DLIYA IKH OPREDELENIYA]**

A. N. KONOVALOV, B. A. SAMOTOKIN, N. IA. VASIN, L. B. LIKHTERMAN, IU. V. ZOTOV, G. A. PEDACHENKO, V. V. LEBEDEV, A. R. SHAKHNOVICH, A. P. FRAERMAN, B. G. BUDASHEVSKII et al. Voprosy Neirokhirurgii, Sept.-Oct. 1982, p. 11-16. In Russian.

## A83-18977

**THE IMPORTANCE OF LABORATORY DATA FOR THE DIFFERENTIATION OF MILD AND MODERATELY SEVERE CRANIOCEREBRAL INJURIES [ZNACHENIE LABORATORNYKH DANNYKH V DIFFERENTSIAL'NOI DIAGNOSTIKE CHEREPNO-MOZGOVOI TRAVMY LEGKOI I SREDNEI STEPENI TIAZHESTI]**

G. P. BURGMAN, E. P. IURISHCHEV, I. N. VIALTSEVA, R. P. OVSIANNIFOVA, I. V. SMIRNOVA, and P. S. DEMINA (Akademiya Meditsinskikh Nauk, Moscow, USSR) Voprosy Neirokhirurgii, Sept.-Oct. 1982, p. 26-34. In Russian. refs

## A83-18979

**OTONEUROLOGICAL SYMPTOMS IN THE DIFFERENTIAL DIAGNOSIS OF MILD AND MODERATELY SEVERE CRANIOCEREBRAL INJURIES [OTONEVROLOGICHESKIE SIMPTOMY V DIFFERENTSIAL'NOI DIAGNOSTIKE CHEREPNO-MOZGOVOI TRAVMY LEGKOI I SREDNEI STEPENI TIAZHESTI]**

N. S. BLAGOVESHCHENSKAYA and V. P. TSVETKOVA (Akademiya Meditsinskikh Nauk SSSR, Moscow, USSR) Voprosy Neirokhirurgii, Sept.-Oct. 1982, p. 21-26. In Russian. refs

## A83-19241

**HIDDEN VISUAL PROCESSES**

J. M. WOLFE (MIT, Cambridge, MA) Scientific American, vol. 248, Feb. 1983, p. 94-103.

Three sets of experiments, each of which reveals a visual process that is hidden from introspection, are described. It is

shown that accommodation can shape the lens of the eye to keep an object in focus only if the system responsible for accommodation is presented with something it can focus on. In order to test whether the accommodation system can 'see' color, subjects attempted to accommodate a circular field divided vertically in half so that it included a single vertical edge and no other feature to focus on; the halves differed in either color or brightness. The results showed that accommodation is colorblind. An experiment involving a subject rotating in a cylinder whose inside surface was covered with a stroboscopically lit pattern showed that there must be at least two binocular mechanisms, one mediating stereoscopic depth perception, the other involving the production of vection. The significance of tilt aftereffect is also discussed. C.D.

## A83-19374

**A RHEOLOGICAL INVESTIGATION OF THE CIRCULATORY SYSTEM DURING HIGH-ALTITUDE HYPOXIA AND AN ORTHOSTATIC TEST [BADANIA REOGRAFICZNE UKLADU KRAZENIA W CZASIE NIEDOTLENIEIA WYSOKOSCOWEGO I BIERNEJ PIONIZACJI]**

L. GOLEC (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland) Postepy Astronautyki, vol. 15, no. 3, 1982, p. 53-63. In Polish. refs

The investigation is carried out on 50 human subjects at ground level and under conditions of high-altitude hypoxia. With oxygen insufficiency, the systolic output is found to increase in importance. The output is measured through a noninvasive method, which makes it suitable for dynamic studies in aviation. C.R.

N83-14891\* National Aeronautics and Space Administration, Washington, D. C.

**AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES, SUPPLEMENT 237**

Oct. 1982 74 p

(NASA-SP-7011(237); NAS 1.21:7011(237)) Avail: NTIS HC \$7.00 CSCL 06E

A bibliography is given on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the Earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion. R.J.F.

N83-14892 Harvard Univ., Cambridge, Mass.

**THE PREDICTION OF INDIVIDUAL MUSCLE FORCES DURING HUMAN MOVEMENT Ph.D. Thesis**

A. G. PATRIARCO 1982 182 p

Avail: Univ. Microfilms Order No. DA8222686

A model of the musculoskeletal system and the necessary experimental means to use the model were developed with the desire of producing a noninvasive, clinical tool capable of quantifying individual muscle behavior and subsequently assisting in the therapeutic correction of neuromuscular pathologies. First, a flexible model framework was constructed in which the body was viewed as a system of rigid links with the muscles treated as torque generators. A muscle force solution was sought which would allow the prediction of individual forces in an observed human movement. The indeterminate solution associated with a redundant number of muscles around a joint was addressed by optimizing one of a variety of criterion. Second, the ability of the model to predict muscle forces was tested in gait studies on normal subjects. Dissert. Abstr.

**N83-14893** Defence Research Information Centre, Orpington (England).

**FUNDAMENTAL EXPERIMENTAL ASPECTS OF LOW-RISK DECOMPRESSION FOLLOWING EXPOSURE TO HIGH PRESSURE**

A. A. BUEHLMANN Jul. 1982 23 p refs Transl. into ENGLISH from Schweizerische Med. Wochenschr. (West Germany), v. 112, no.2, 1982 p 48-59 (DRIC-T-6629; BR84492) Avail: Issuing Activity

In exposure tests to an ambient pressure of 3.92 bar or 4.41 bar in a hyperbaric chamber, 315 subjects breathed air or oxygen-helium mixture for periods between a few minutes and several hours. Decompression was carried out without changing the breathing mixture or by breathing 100% oxygen and also with air breathing in the case of the helium exposure. A linear formula which calculates tolerated ambient pressure was derived. This rule yields decompression profiles which agree with the decompression tables of the US Navy after short air dives. The decompression times after long air dives are longer than those of the emergency tables of the US Navy. For long helium exposures, the American rule indicates much longer decompression times without greater security than those of the system described. Author (ESA)

**N83-14894** Defence Research Information Centre, Orpington (England).

**LENS CHANGES IN THE FORM OF RADIATION CATARACTS**

B. TENGROTH Aug. 1982 11 p refs Transl. into ENGLISH from Arbeitsmed. Sozialmed. Praeventivmed. (West Germany), v. 16, no. 2, 1981 p 36-39

(DRIC-T-4740; BR84623) Avail: Issuing Activity

The risk of cataracts to workers exposed to high levels of IR radiation and microwaves is discussed. Links between IR radiation and lens opacity are reviewed. A study of the incidence of cataracts in workers in potentially hazardous environments does not prove the connection between infrared radiation and microwaves with cataracts. Author (ESA)

**N83-14895** Defence Research Information Centre, Orpington (England).

**HAZARDS TO MAN FROM MICROWAVE AND RADIO WAVES**

J. H. BERNHARDT Aug. 1982 9 p refs Transl. into ENGLISH from Arbeitsmed. Sozialmed. Praeventivmed. (West Germany) v. 16, no. 2, 1981 p 33-36

(DRIC-T-6742; BR84637) Avail: Issuing Activity

The dosimetric concept of absorbed specific power, the frequency dependence of which serves as a basis for the establishment of protection standards, is discussed. For frequencies 30 MHz, the 10 mW/sq cm limit is supported. For frequencies in the 10 to 30 MHz range, electrical and magnetic field strength must be considered, rather than thermal stressing factors. Below 100 kHz, field-induced potential differences may be important.

Author (ESA)

**N83-14896\*** Massachusetts Inst. of Tech., Cambridge. Man Vehicle Lab.

**A HEURISTIC MATHEMATICAL MODEL FOR THE DYNAMICS OF SENSORY CONFLICT AND MOTION SICKNESS**

C. M. OMAN 1982 44 p refs Repr. from Acta Oto-Laryngol., Suppl. 392 (Sweden),

(Contract NAS9-15343; NCC9-1; NSG-2032)

(NASA-CR-169683; NAS 1.26:169683; MVT-80-1;

ISSN-0365-5237) Avail: NTIS HC A03/MF A01 CSCI 06E

The etiology of motion sickness is now usually explained in terms of a qualitatively formulated sensory conflict hypothesis. By consideration of the information processing task faced by the central nervous system in estimating body spatial orientation and in controlling active body movement using an internal model referenced control strategy, a mathematical model for sensory conflict generation is developed. The model postulates a major dynamic functional role for sensory conflict signals in movement control, as well as in sensory motor adaptation. It accounts for the role of active movement in creating motion sickness symptoms in some experimental circumstances, and in alleviating them in

others. The relationship between motion sickness produced by sensory rearrangement and that resulting from external motion disturbances is explicitly defined. A nonlinear conflict averaging model describes dynamic aspects of experimentally observed subjective discomfort sensation, and suggests resulting behavior.

S.L.

**N83-14897#** European Space Agency, Paris (France).

**ZERO-G SIMULATION FOR GROUND-BASED STUDIES IN HUMAN PHYSIOLOGY, WITH EMPHASIS ON THE CARDIOVASCULAR AND BODY FLUID SYSTEMS**

N. LONGDON, ed. Aug. 1982 158 p refs Partly in ENGLISH and FRENCH Workshop held in Toulouse, 4-5 Mar. 1982; sponsored by ESA and CNES

(ESA-SP-180; ISSN-0379-6566) Avail: NTIS HC A08/MF A01

Bed rest, water immersion, lower body negative pressure and tilt table studies of the physiological effects of weightlessness were discussed. Space mission experience was compared with simulation. The need to standardize experimental design was stressed.

**N83-14898#** Centre Hospitalier Universitaire Rangueil, Toulouse (France). Lab. d'Hemodynamique.

**DECUBITUS AS A METHOD OF SIMULATING THE CARDIOVASCULAR AND METABOLIC EFFECTS OF MICROGRAVITY ON THE HUMAN BODY [LE DECUBITUS COMME METHODE DE SIMULATION DES EFFETS CARDIOVASCULAIRES ET METABOLIQUES OBSERVES CHEZ L'HOMME PLACE SOUS MICROGRAVITE]**

A. GUELLE, P. DUPUI, C. GHARIB (Lyon Univ.), and A. BESS In ESA Zero-g Simulation for Ground-Based Studies in Human Phys., with Emphasis on the Cardiovascular and Body Fluid Systems p 3-9 Aug. 1982 refs In FRENCH

Avail: NTIS HC A08/MF A01

Horizontal and head down simulation studies of weightlessness are reviewed. Results from these studies are compared with those from space flight. Objectively and subjectively, head down decubitus closely reproduces symptoms described by astronauts, arising from the displacement of fluid towards the upper body, especially the brain. Results concerning hydroelectrolytic balance and its hormonal regulation are consistent (e.g., increased diuresis, increased hematocrit), but data on the evolution of hormone rates varies considerably. This is ascribed to nonstandardized experimental design.

Author (ESA)

**N83-14899#** Hopital Bellevue Saint Etienne (France). Dept. de Readaptation Medicale.

**INFLUENCE OF IMMOBILITY AND WEIGHTLESSNESS ON BONE TISSUE [INFLUENCE DE L'IMMOBILISATION ET DE L'IMPESANTEUR SUR LE TISSU OSSEUX]**

P. MINAIRE and C. ALEXANDRE In ESA Zero-g Simulation for Ground-Based Studies in Human Phys., with Emphasis on the Cardiovascular and Body Fluid Systems p 11-21 Aug. 1982 In FRENCH

Avail: NTIS HC A08/MF A01

The biochemical, histomorphometric, and vascular effects of immobility and weightlessness in man and animals are outlined. The orthophysiopathologies of immobility and weightlessness are compared. Immobility and weightlessness cause a loss of bone tissue of up to 1/3 of total trabecular bone mass. The cortical bones also lose mass. These losses are due to overabsorption of bone tissue because of local vascular modifications, and under formation of bone because of the absence of mechanical stimulation. Immobility-weightlessness comparisons are of limited value because of the continuing effects of gravity in immobility studies, and nonstandardized experimental design. Author (ESA)



**N83-14900#** Deutsche Sporthochschule, Cologne (West Germany). Physiologisches Inst.

**A CRITICAL EVALUATION OF THE EMPLOYMENT OF WATER IMMERSION TECHNIQUES IN INVESTIGATIONS RELATING TO PHYSIOLOGICAL REACTIONS DURING SPACE FLIGHT**

W. SKIPKA and U. SCHRAM /In ESA Zero-g Simulation for Ground-Based Studies in Human Phys., with Emphasis on the Cardiovascular and Body Fluid Systems p 29-38 Aug. 1982 refs

Avail: NTIS HC A08/MF A01

Inconsistencies between immersion test predictions and space flight findings, e.g. as regards aldosterone suppression or diuresis are discussed. Three reasons are given for these discrepancies: the counter-regulatory stage and the adaptation stage of space flight, which are especially important for hormone as well as fluid and electrolyte balance, are not frequently simulated by immersion. While most of the results of immersion experiments are taken from data recorded during complete rest, data collected in space are heavily influenced by physical work. Subjects in immersion experiments are unlikely to be as physically fit as those who take part in space flights. Author (ESA)

**N83-14901#** Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Inst. for Aerospace Medicine.

**LOWER BODY NEGATIVE PRESSURE (LBNP): A METHOD OF CONTROLLED CIRCULATION DISORDER**

F. BAISCH, J. BEIER, U. GEBHARDT, J. R. HORDINSKY, and H. MORSBACH /In ESA Zero-g Simulation for Ground-Based Studies in Human Phys., with Emphasis on the Cardiovascular and Body Fluid Systems p 43-75 Aug. 1982 refs

Avail: NTIS HC A08/MF A01

The effects of LBNP, spaceborne and ground based investigations of these effects, and LBNP experimental design are discussed. In general, LBNP leads to a shift of intrathoracic blood volume into the body regions exposed to negative pressure. The LBNP-induced responses in the arterial system are similar to those seen in head up tilt (HUT). However, in LBNP venous pressure is uniformly reduced, whereas in HUT venous pressure increases down the long body axis. The LBNP also imposes humoral stimuli: responses of catecholamines, their precursors and metabolites in blood and urine, and increases of renin, aldosterone, and cortisol are reported. In order to reproduce equal effects on the intrathoracic organs, it is suggested that LBNP protocols be adapted to integral lower body compliance. Author (ESA)

**N83-14902#** Graz Univ. (Austria). Physiologisches Inst.

**TILT TABLE AND RELATED STUDIES**

H. HINGHOFER-SZALKAY /In ESA Zero-g Simulation for Ground-Based Studies in Human Phys., with Emphasis on the Cardiovascular and Body Fluid Systems p 81-102 Aug. 1982 refs

Avail: NTIS HC A08/MF A01

Short term physiological events which occur in the human body after changes in the direction of gravitational force are discussed. The effect of posture on exercise performance is considered. Hemodynamic changes, blood volume and capillary fluid shifts, hormonal changes, and the receptor areas involved in modulating the autonomous responses are treated. Circulation in the head, lungs, abdomen, skin, and muscles is described. The physical and psychological discrepancies between ground based experiment and space flight are mentioned. Author (ESA)

**N83-14903\*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**CARDIOVASCULAR RESPONSES TO WEIGHTLESSNESS AND GROUND-BASED SIMULATIONS**

H. SANDLER /In ESA Zero-g Simulation for Ground-Based Studies in Human Phys., with Emphasis on the Cardiovascular and Body Fluid Systems p 107-146 Aug. 1982 refs

Avail: NTIS HC A08/MF A01

Mission experience, from NASA and Soviet programs, on human cardiovascular responses to weightlessness, and the ability of bed

rest studies to simulate these are discussed. In-flight effects include fluid shift to the upper body, decreased heart size, bone demineralization, orthostatic intolerance, and loss of exercise tolerance. All the cardiovascular changes that occur with weightlessness also occur with prolonged bed rest. They are most manifest when subjects stand suddenly, or undergo tilting or lower body negative pressure. The mechanisms which control these responses, e.g., the role of the central nervous system, are unclear. Author (ESA)

**N83-14904#** Army Research Inst. of Environmental Medicine, Natick, Mass.

**HYPOHYDRATION AND EXERCISE: EFFECTS OF GENDER, ENVIRONMENT AND HEAT ACCLIMATION**

M. N. SAWKA, M. M. TONER, R. P. FRANCESCONI, and K. B. PANDOLF 19 Jul. 1982 33 p refs

(Contract DA PROJ. 3E1-62777-A-878) (AD-A118669; USARIEM-M-38/82) Avail: NTIS HC A03/MF A01 CSCL 06S

The effects of heat acclimation and subjects gender on treadmill exercise in a comfortable hot-dry and a hot-wet environment while subjects were hypo or dehydrated were examined. Six male and six female subjects, matched for maximal aerobic power and percent body fat, attempted two exercise tests in environment both before and after a 10-day heat acclimation program. No significant differences were noted between men and women at the completion of exercise for rectal temperature (Tre), mean skin temperature (Tsk) or heart rate (HR) during any of the experimental conditions. Hypohydration was generally found to increase Tre and HR responses as well as to decrease sweat rate value while not altering Tsk responses. In the hypohydration experiments, heat acclimation significantly reduced Tre and HR responses in the comfortable environments, but reduced only HR responses in the hot-dry and hot-wet environments. It is indicated that men and women respond in a physiologically similar manner to hypohydration during exercise. It is also suggested that an expanded plasma volume, mediated by heat acclimation, may have attenuated Tre and HR responses during hypohydration. GRA

**N83-14905#** Beth Israel Medical Center, N.Y. Dept. of Pathology.

**STUDIES ON THE MECHANISM AND PREVENTION OF DECOMPRESSION SICKNESS Final Technical Report, 1 Jun. 1968 - 28 Feb. 1982**

C. CHRYSSANTHOU 12 Jul. 1982 155 p refs

(Contract N00014-75-C-0312)

(AD-A118623) Avail: NTIS HC A08/MF A01 CSCL 06S

The studies focused on three main areas: Decompression Sickness, Dysbaric Osteonecrosis and Dysbaric Alteration of the Blood-Brain Barrier. On decompression sickness, attempts were made to elucidate pathogenetic mechanisms. Several hypotheses were advanced and novel pathogenetic concepts were proposed. On the basis of new theoretical considerations we were able to develop means for the prevention or amelioration of the disease. Regarding dysbaric osteonecrosis, we developed an animal model which permitted studies on the etiology predisposition and pathogenesis of the disorder. The most recent investigations covered by this report involve dysbaric modification of blood-tissue barriers, an observation which was made in our Laboratories few years ago. The report includes an overview (summary) of the investigations conducted in these areas with references to pertinent publications. In lieu of detailed description of the work done, reprints to pertinent publications. In lieu of detailed description of the work done, reprints of representative articles have been attached. We hope that this material might be of help to those interested in the fields of dysbaric disorders. GRA

**N83-14906#** Pennsylvania Univ., Philadelphia. School of Medicine

**MAPPING OF FUNCTIONAL ACTIVITY IN BRAIN WITH 18F-FLUORO-DEOXYGLUCOSE**

A. ALAVI, M. REIVICH, J. GREENBERG, and A. WOLF (Brookhaven National Lab., Upton, N.Y.) 1981 4 p refs Presented at the European Soc. of Nucl. Med., Bern, 8 Sep. 1981 Sponsored in part by US Public Health Service (Contract DE-AC02-76CH-00016) (DE82-002856; BNL-30224; CONF-810996-1) Avail: NTIS HC A02/MF A01

A model based on the assumptions of a steady state for glucose consumption, a first order equilibration of the free 14C-DG pool in the tissue with the plasma level, and relative rates of phosphorylation of 14C-DG and glucose determined by their kinetic constants for hexokinase reaction was desired. Using an operational equation based on this model, the metabolic rates of glucose are calculated in various regions of brain. 14C is a beta emitter and therefore not suitable for noninvasive imaging in man. With the synthesis of 18F-2-deoxy-2-fluoro-D-glucose (18F-DG) all of the requirements for a suitable radiopharmaceutical for the determination of local cerebral metabolism are met. This agent behaves very similarly to 14C-DG and therefore, using the above described model and emission tomography, it is possible to measure regional cerebral metabolism for the first time in man.

GRA

**N83-14907#** California Univ., Los Angeles. Lab. of Biomedical and Environmental Sciences.

**DEOXYGLUCOSE METHOD FOR THE ESTIMATION OF LOCAL MYOCARDIAL GLUCOSE METABOLISM WITH POSITRON COMPUTED TOMOGRAPHY**

O. RATIB, M. E. PHELPS, S. C. HUANG, E. HENZE, C. E. SELIN, and H. R. SCHELBERT 1981 23 p refs (Contract DE-AC03-76SF-00012) (DE82-004306; UCLA-12-1324) Avail: NTIS HC A02/MF A01

The deoxyglucose method originally developed for measurements of the local cerebral metabolic rate for glucose was investigated for its application to studies of the heart with positron computed tomography (PCT) and FDG. Studies were performed in dogs to measure the tissue kinetics of FDG with PCT and by direct arterial venous sampling. The FDG method accurately predicted the true MMRGlc even when the glucose metabolic rate was normal but myocardial blood flow (MBF) was elevated five times the control value or when metabolism was reduced to 10% of normal and MBF increased five times normal. Improvements in PCT resolution are required to improve the accuracy of the estimates of the rate constants and the MMRGlc.

GRA

**N83-14908#** Pacific Northwest Lab., Richland, Wash.

**DISSOLUTION RATES OF URANIUM COMPOUNDS IN SIMULATED LUNG FLUID**

D. R. KALKWARF 1981 14 p refs Presented at the 21st Hanford Life Sci. Symp. on Biol. Availability of Trace Metals, Richland, Wash., 4 Oct. 1981 (Contract DE-AC06-76RL-01830) (DE82-003857; PNL-SA-9589; CONF-811035-4) Avail: NTIS HC A02/MF A01

Maximum dissolution rates of uranium into simulated lung fluid from a variety of materials were measured at 37 deg in the where  $f_{sub i/}$  is to estimate clearance rates from the deep lung. A batch procedure was utilized in hich samples containing as little as 10 micro of natural urnaium could be tested. The materials included: products of uranium mining, milling and refining operations, coal fly ash, an environmental sample from a site exposed to multiple uranium sources, and purified samples of (NH<sub>4</sub>)<sub>2</sub>U<sub>2</sub>O<sub>7</sub>U<sub>3</sub>O<sub>8</sub>, UO<sub>2</sub>, and UF<sub>4</sub>. Dissolution of uranium from several materials indicated the presence of more than one type of uranium compound. Dissolution occurred predominantly by formation of the UO<sub>2</sub>(CO<sub>3</sub>)<sub>34-</sub> ion. Tetravalent uranium compounds dissolved slowly. It is found that dissolution rates of size separated

yellow-cake aerosols are more closely correlated with specific surface area than with aerodynamic diameter. GRA

**N83-14909#** Brookhaven National Lab., Upton, N. Y. Biology Dept.

**ULTRAVIOLET-LIGHT-INDUCED TRANSFORMATION OF HUMAN PRIMARY CELLS**

B. M. SUTHERLAND 1981 20 p refs Presented at the NATO CNEN Conf., Rome, 24 Aug. - 5 Sep. 1981 (Contract DE-AC02-76CH-00016) (DE82-002250; BNL-30102; CONF-810873-3) Avail: NTIS HC A02/MF A01

The development of model systems for probing the ultraviolet radiation induced oncogenic transformation of human skin cells is described. DOE

**N83-14910#** Oak Ridge National Lab., Tenn.

**ESTIMATES OF HEALTH RISK FROM EXPOSURE TO RADIOACTIVE POLLUTANTS**

R. E. SULLIVAN, N. S. NELSON, W. H. ELLETT, D. E. DUNNING, JR., R. W. LEGGETT, M. G. YALCINTAS, and K. F. ECKERMAN Nov. 1981 65 p refs (Contract W-7405-ENG-26) (DE82-002486; ORNL/TM-7745) Avail: NTIS HC A04/MF A01

A dosimetric and health effects analysis has been performed for the Office of Radiation Programs of the Environmental Protection Agency (EPA) to assess potential hazards from radioactive pollutants. Contemporary dosimetric methods were used to obtain estimates of dose rates to reference organs from internal exposures due to either inhalation of contaminated air or ingestion of contaminated foods, or from external exposures due to either immersion in contaminated air or proximity to contaminated ground surfaces. These dose rates were then used to estimate the number of premature cancer deaths arising from such exposures and the corresponding number of years of life lost in a cohort of 100,000 persons, all simultaneously liveborn and all going through life with the same risks of dying from compeling causes. The risk of dying from a competing cause for a given year was taken to be the probability of dying from all causes as given in a recent actuarial life table for the total US population. DOE

**N83-14911#** Research Inst. of National Defence, Stockholm (Sweden).

**FACTOR ANALYTICAL DESCRIPTION OF NIGHT VISION TESTS**

L. PERSSON; H. LEYON, and H. MARMOLIN Aug. 1982 24 p refs (FOA-C-53008-H2) Avail: NTIS HC A02/MF A01

Human night vision capacity is described by interindividual correlations between different night vision tests. A component analysis showed that four independant factors explained 74% of the total variance: light sensitivity, contrast sensitivity, dark adaptation, and glare recovery. The high reliability and validity figures obtained point to the possibility of predicting night vision performance on the basis of these factors. Author (ESA)

**N83-14912#** Technische Hogeschool, Eindhoven (Netherlands). Dept. of Electrical Engineering.

**DETECTION OF TRENDS IN LONG TERM RECORDINGS OF CARDIOVASCULAR SIGNALS**

N. SARANUMMI (Technical Research Centre of Finland, Tampere) Apr. 1982 142 p refs (EUT-82-E-125; ISBN-90-6144-125-0) Avail: NTIS HC A07/MF A01

Trend detection algorithms in cardiovascular signals are studied and compared with each other in order to select a trend detection procedure. Proposed methods include the exponentially mapped past filter (EMP) which is very simple to implement and reliable but has a rather slow response. A second degree Kalman filter which is also simple to implement is investigated thoroughly. It is better than EMP filters since it can be tuned to the statistics of the signal and the measurements. A best choice for a trend detector that is able to operate in the presence of measurement errors is



described as a combination of an EMP Filter, a second order Kalman filter to estimate the first derivative of the signal and a statistical test to assess the skewing of the first derivative from zero.

Author (ESA)

**N83-14913#** Centre Technique des Industries Mecaniques, Senlis (France).

**MOIRE EFFECT CELLS. INTRODUCTION TO A PHYSIOLOGICAL EFFECT AND EXPLOITATION OF SLOTTED INTEGRATORS Final Report [CELLULES A EFFET DE MOIRE. INTRODUCTION D'UNE APPROCHE PHYSIOLOGIQUE ET EXPLOITATION PAR DES INTEGREURS A FENTES]**

M. PARASKEVAS May 1982 36 p refs In FRENCH (CETIM-15-G-061) Avail: NTIS HC A03/MF A01

Starting from a psychophysiological analysis of the Moire effect, a mathematical model of the light intensity transmitted by two systems of parallel bars crossing each other at a given angle is described, and the possibility of integration by optical measurement using one or more rectangular opening diaphragms is demonstrated. Experimental measurements confirm the theoretical model. The technique allows the determination of the angle between both networks with an accuracy of 1 arcmin and the polar coordinates of the rotation center with an accuracy of 0.5 mm.

Author (ESA)

**N83-16012#** Army Intelligence and Threat Analysis Center, Arlington, Va.

**MILITARY LABOR HYGIENE AND PHYSIOLOGY**

A. T. MARYANOVICH In *its* Mil. Med. J., No. 7, 1982 (L-2129) p 58-61 1982 refs Transl. into ENGLISH from Voenno-Med. Zh. (Moscow), No. 7, Jul. 1982

Avail: NTIS HC A07/MF A01

The assumption that fractional exposure to the thermal factor at high intensity causes more strongly expressed adaptive changes in the human organism than ordinary continuous conditions was tested.

Author

**N83-16013#** Army Intelligence and Threat Analysis Center, Arlington, Va.

**ANALYSIS OF THERMAL STRESS EVALUATION METHODS**

V. P. KOVALENKO and V. V. PASTUKHOV In *its* Mil. Med. J., No. 7, 1982 (L-2129) p 62-64 1982 Transl. into ENGLISH from Voenno-Med. Zh. (Moscow), No. 7, Jul. 1982

Avail: NTIS HC A07/MF A01

The thermal status was evaluated by the rectal temperature and weighted mean skin temperature as measured at 11 points. The functional status of the cardiovascular system was studied by mechanocardiography, electrocardiography and plethysmography. Respiration was studied by determining gas metabolism and recording the respiration frequency. The functional status of the central nervous system was studied by means of the reaction to a moving object, simple sensimotor reactions and by the correction test with Landolt rings. The functional status of the motor analyzer was determined by measuring the maximum and static endurance of the muscles of the hand, and also the static and dynamic tremor. The Weber-Vivkin method was used to study skin discrimination sensitivity. The status of the sympathetic-adrenal system was evaluated from the quantity of 17-oxycorticosteroids, creatinine and urea excreted with the urine. Carbohydrate metabolism was studied from the content of lactic and pyruvic acid in the blood.

Author

**N83-16018#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**SPACE GERONTOLOGY**

J. MIQUEL, ed. and A. C. ECONOMOS, ed. (Technology, Inc., Mountain View, Calif.) Washington Nov. 1982 125 p refs Workshop held at Moffett Field, Calif., 30-31 Jan. 1978

(NASA-CP-2248; A-8627; NAS 1.55:2248) Avail: NTIS HC A06/MF A01 CSCL 06S

Presentations are given which address the effects of space flight on the older person, the parallels between the physiological responses to weightlessness and the aging process, and

experimental possibilities afforded by the weightless environment to fundamental research in gerontology and geriatrics.

**N83-16019#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**COMPARISON BETWEEN THE WEIGHTLESSNESS SYNDROME AND AGING**

J. MIQUEL In *its* Space Gerontology p 1-8 Nov. 1982 refs Avail: NTIS HC A06/MF A01 CSCL 06S

The similarity of detrimental effects of normal aging and of exposure to space weightlessness is discussed. The effects include: the reduction in cardiac output, increase in blood pressure, decrease in respiratory vital capacity, decrease in lean body weight and muscle mass, collagen and fat infiltration of muscle, bone demineralization, and a decrease in urinary excretion of total 17-hydroxycorticosteroids. It is also noted that despite the accelerated aging of organisms, if animals or human subjects were to spend their entire lives in weightlessness, their lifespans might be significantly increased because of a reduction in metabolic rate. Experimental results are cited.

M.G.

**N83-16020#** Stanford Univ., Calif. Dept. of Pathology.

**A PATHOLOGIST'S VIEW ON THE EFFECTS OF VERY LONG EXPOSURE TO WEIGHTLESSNESS**

K. G. BENSCH In NASA. Ames Research Center Space Gerontology p 9-11 Nov. 1982

Avail: NTIS HC A06/MF A01 CSCL 06S

Speculations concerning the probable consequences of exposure to weightlessness during periods of one year or more and how these effects compare with aging are made. Orthostatic and exercise intolerance, neurological and muscular effects, cell division and DNA synthesis, tissue hypoxia, and edema are discussed in reference to the in-space and return-to-Earth situations.

M.G.

**N83-16021#** Technology, Inc., Mountain View, Calif. Life Sciences Div.

**HUMAN HOMEOSTASIS IN THE SPACE ENVIRONMENT: A SYSTEMS SYNTHESIS APPROACH**

A. C. ECONOMOS In NASA. Ames Research Center Space Gerontology p 13-36 Nov. 1982 refs

Avail: NTIS HC A06/MF A01 CSCL 06S

The features of homeostatic changes which occur during adaptation to the weightless state are examined and the possible mechanisms underlying the responses are explored. Cardiac output, negative fluid balance, body weight, bone calcium, and muscle atrophy are discussed. Some testable hypotheses concerning possible effects on homeostasis that long-term exposure to weightlessness might cause are proposed.

M.G.

**N83-16024#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**SPACE WEIGHTLESSNESS AND HORMONAL CHANGES IN HUMAN SUBJECTS AND EXPERIMENTAL ANIMALS**

R. E. GRINDELAND In *its* Space Gerontology p 55-57 Nov. 1982

Avail: NTIS HC A06/MF A01 CSCL 06S

Data from spaceflight and bed rest studies are briefly described and the difficulties in interpreting these results are discussed. Growth hormone, prolactin, adrenocorticotrophic hormone, cortisol, insulin, aldosterone, and other hormones are addressed.

M.G.

**N83-16026#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**EFFECT OF EXERCISE ON THE PSEUDODIABETES OF BED REST**

J. E. GREENLEAF In *its* Space Gerontology p 67-74 Nov. 1982 refs

Avail: NTIS HC A06/MF A01 CSCL 06S

The effect of intensive isotonic exercise and isometric exercise (with its low metabolic rate) during bed rest on plasma insulin and glucose tolerance test was investigated. The subjects were seven healthy men, 19 to 22 years in age, 166 to 188 cm in height, and

62.40 to 103.80 kg in weight; maximal oxygen uptakes ranged from 3.36 to 4.38 liters/min. It appears that bed-rest-induced glucose intolerance is diminished with increasing energy expenditure during both bed rest and recovery. M.G.

**N83-16028\*#** Argonne National Lab., Ill. Div. of Biomedical Research.

#### ENERGY METABOLISM AND LIFESPAN

G. SACHER *In* NASA. Ames Research Center Space Gerontology p 81-84 Nov. 1982 refs  
 Avail: NTIS HC A06/MF A01 CSCL 06S

An experiment to determine how the longevity of individual animals and genotypes within species depended on body weight and metabolic rate is described. M.G.

**N83-16029\*#** Michigan State Univ., East Lansing. Dept. of Physiology.

#### THE NEUROENDOCRINE SYSTEM AND AGING

J. MEITES *In* NASA. Ames Research Center Space Gerontology p 85-87 Nov. 1982  
 Avail: NTIS HC A06/MF A01 CSCL 06S

The role of the neuroendocrine system in aging processes is discussed with an emphasis on the decline of reproductive function, using rate as a model. M.G.

**N83-16030\*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

#### A SUMMARY OF SPACE GERONTOLOGICAL IDEAS

A. C. ECONOMOS (Technology, Inc., Mountain View, Calif.) and J. MIQUEL *In* its Space Gerontology p 99-102 Nov. 1982  
 Avail: NTIS HC A06/MF A01 CSCL 06S

Several hypotheses relating the effects of weightlessness and the aging process are proposed and commented on. M.G.

**N83-16031\*#** Technology, Inc., Mountain View, Calif. Life Sciences Div.

#### TOPICS IN SPACE GERONTOLOGY: EFFECTS OF ALTERED GRAVITY AND THE PROBLEM OF BIOLOGICAL AGE

A. C. ECONOMOS *In* NASA. Ames Research Center Space Gerontology p 103-111 Nov. 1982 refs  
 Avail: NTIS HC A06/MF A01 CSCL 06S

The use of altered gravity experimentation as a gerontological research tool is examined and a rationale for a systems approach to the adaptation to spaceflight is presented. The dependence of adaptation capacity on biological age is also discussed. M.G.

**N83-16032\*#** Civil Aeromedical Inst., Oklahoma City, Okla.

#### AGING AND SPACE TRAVEL

S. R. MOHLER *In* NASA. Ames Research Center Space Gerontology p 113-118 Nov. 1982 refs Repr. from Aerospace Med., v. 33, 1962 p 594-597  
 Avail: NTIS HC A06/MF A01 CSCL 06S

The matter of aging and its relation to space vehicle crewmembers undertaking prolonged space missions is addressed. The capabilities of the older space traveler to recover from bone demineralization and muscle atrophy are discussed. Certain advantages of the older person are noted, for example, a greater tolerance of monotony and repetitious activities. Additional parameters are delineated including the cardiovascular system, the reproductive system, ionizing radiation, performance, and group dynamics. M.G.

**N83-16033\*#** California Univ., Los Angeles. Neuropsychiatric Inst.

#### AEROSPACE GERONTOLOGY

A. COMFORT *In* NASA. Ames Research Center Space Gerontology p 119-122 Nov. 1982 Repr. from the book "The Biology of Senescence" Elsevier North Holland, Inc., 1979  
 Avail: NTIS HC A06/MF A01 CSCL 06S

The relevancy of gerontology and geriatrics to the discipline of aerospace medicine is examined. It is noted that since the shuttle program gives the facility to fly passengers, including specially qualified older persons, it is essential to examine response to acceleration, weightlessness, and re-entry over the whole adult

lifespan, not only its second quartile. The physiological responses of the older person to weightlessness and the return to Earth gravity are reviewed. The importance of the use of the weightless environment to solve critical problems in the fields of fundamental gerontology and geriatrics is also stressed. M.G.

**N83-16034#** Army Intelligence and Threat Analysis Center, Arlington, Va.

#### MILITARY MEDICAL JOURNAL, NO. 6, 1982

30 Oct. 1982 139 p refs Transl. into ENGLISH of Voenno-Med. Zh. (Moscow), No. 6, Jun. 1982  
 (L-2003) Avail: NTIS HC A07/MF A01

Different aspects of medical treatment are presented, including: intra-articular fracture of the tibial condyles, purulent infection and heart disease. Medical problems in military situations are also discussed.

**N83-16035#** Army Intelligence and Threat Analysis Center, Arlington, Va.

#### DIAGNOSIS OF CARDIAC RHYTHM AND CONDUCTIVITY DISORDERS AND THEIR EXPERT EVALUATION AMONG FLIGHT PERSONNEL

V. A. KOLEDENOK, V. M. KONDRAKOV, and N. A. LYSOGOR *In* its Mil. Med. J., No. 6, 1982 (L-2003) p 65-70 30 Oct. 1982 refs Transl. into ENGLISH from Voenno-Med. Zh. (Moscow), No. 6, Jun. 1982

Avail: NTIS HC A07/MF A01

The frequency of cardiac rhythm disorders and conductivity disorders in flight personnel at rest and with measured physical loads was studied. The results of clinical and instrumental examination of a large number of flight personnel 20 to 54 years of age were analyzed. In 13.9% of the cases the subjects, when at rest and when exercising at submaximal rates, revealed various forms of arrhythmias and intracardiac block. Depending on the final diagnosis these persons were divided into five groups. S.L.

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### BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

**A83-16865**

#### PHENOMENAL COHERENCE OF MOVING VISUAL PATTERNS

E. H. ADELSON and J. A. MOVSHON (New York University, New York, NY) Nature, vol. 300, Dec. 9, 1982, p. 523-525. refs (Contract NIH-EY-1017)

While when two crossed moving gratings are superimposed, the plaid pattern that can be viewed through them moves unambiguously and predictably, there are cases in which two gratings do not combine into a single coherent percept, but rather appear to slide across one another. The present study of conditions under which coherence does and does not occur leads to the conclusion that coherence depends on the relative contrasts, spatial frequencies and directions of motion of the gratings. It is suggested that these effects reveal the as yet unstudied properties of a higher order stage of motion analysis. O.C.

**A83-17163**

#### DIURNAL BIOLOGICAL RHYTHMS AND PARANOID SCHIZOPHRENIA [SUTOCHNYE BIOLOGICHESKIE RITMY I PARANOIDNAIA SHIZOFRENIYA]

V. I. TSARITSINSKII (Khar'kovskii Nauchno-Issledovatel'skii Institut Nevrologii i Psikiatrii, Kharkov; II Voroshilovgradskaia Oblastnaia Psikiatricheskaia Bol'nitsa, Svatovo, Ukrainian SSR) Vrachebnoe Delo, Aug. 1982, p. 99-102. In Russian. refs

A83-17180

**TYPES OF TRACE EFFECTS FROM THE PERCEPTION OF VERBAL INFORMATION [TIPY SLEDOVYKH EFFEKTOV OT VOSPRIYATIYA VERBAL'NOI INFORMATSII]**

V. A. SUZDALEVA Voprosy Psikhologii, Sept.-Oct. 1982, p. 128-135. In Russian. refs

An attempt to elucidate the different roles of short-term and long-term memories in the processing of verbal information in humans is presented. The experiments recorded the latent periods of speech reactions to verbal stimuli of varied complexity. The results support the idea of an active character for memory traces which facilitate or hinder the subsequent perception of verbal material. It is found that in some individuals the trace effects (the facilitation and hindering of the perception of verbal information) fades with time, while in other individuals the memory traces are preserved or are slightly deepened. In addition, deeper and more prolonged trace effects are found to be linked with better retention of verbal information in the memory. N.B.

A83-17181

**THE STRUCTURE OF QUALITATIVE INDIVIDUAL PECULIARITIES OF EMOTIONALITY [STRUKTURA KACHESTVENNYKH INDIVIDUAL'NYKH OSOBNOSTEI EMOTSIONAL'NOSTI]**

A. A. PLOTKIN Voprosy Psikhologii, Sept.-Oct. 1982, p. 114-118. In Russian. refs

The types of individual, stable peculiarities of emotionality and their correlations are investigated in humans. Results show that emotionality functions as a unitary structure, and there are connections between the parameters which characterize the individual qualitative peculiarities of emotionality in the three basal modalities (joy, anger, fright). The types of correlations of the modalities are linked with the sex of the individual. It is found that in males, the predisposition to joy is connected with a tendency toward anger, while in females it is connected with a tendency toward fright. Other types of correlations were detected in which the predisposition to anger is connected with a tendency toward fright. N.B.

A83-17306#

**TOTAL SIMULATION FOR AIRLINE APPLICATIONS /LINE ORIENTED FLIGHT TRAINING/**

K. J. WARRAS (Air Line Pilots Association, Washington, DC) In: Radio Technical Commission for Aeronautics, Technical Symposium and Annual Assembly Meeting, Washington, DC, November 18-20, 1981, Proceedings. Washington, DC, Radio Technical Commission for Aeronautics, 1982, p. 77-83.

The major portion of air carrier simulator training for pilots consists currently of practicing a series of independent maneuvers which would ultimately enable the pilot to control the aircraft under both normal and adverse stalls, steep turns, and precision and nonprecision approaches. This type of training will continue to be very important in any type of pilot training program. However, the considered type of training has to be supplemented by training involving other aspects, because no experience is provided in problem solving or resource management and it has to be taken into account that in the air carrier industry the pilot is part of a team consisting of one or two additional members. In 1980, the FAA adopted the Advanced Simulator Plan for air carriers. The general characteristics of the three phases of the plan are discussed. In Phase II of the Advanced Simulator Program, a Line Oriented Flight Training (LOFT) program is to be implemented. LOFT is a line environment flight training program with full cockpit crew participation in real world experiences. G.R.

A83-17308#

**COMPUTER-BASED PRE-SIMULATOR TRAINING**

S. R. TROLLIP (Illinois, University, Urbana, IL) In: Radio Technical Commission for Aeronautics, Technical Symposium and Annual Assembly Meeting, Washington, DC, November 18-20, 1981, Proceedings. Washington, DC, Radio Technical Commission for Aeronautics, 1982, p. 93-100.

Two different realms of application are described which illustrate the characteristics and advantages of computer-assisted instruction (CAI). One of these is currently being used by airlines as a presimulator training device, and may be applicable in general aviation training of student pilots to use VOR radio navigation. The other set of CAI applications involves the simulation of such flight instruments as heading and rate-of-turn indicators for the training of relatively inexperienced pilots. O.C.

A83-17309#

**IMPROVING SIMULATION TRAINING THROUGH RESEARCH**

R. T. HENNESSY (National Research Council, Washington, DC) In: Radio Technical Commission for Aeronautics, Technical Symposium and Annual Assembly Meeting, Washington, DC, November 18-20, 1981, Proceedings. Washington, DC, Radio Technical Commission for Aeronautics, 1982, p. 101-114. refs

An assessment of the last quarter century's progress in the development of flight training simulators is presented, with emphasis on the behavioral psychology and experimental methodology aspects of simulator design. It is noted that research in visual display optimization need not be restricted to conventional, out-of-the-cockpit scenery. It is possible that unconventional displays may prove superior to conventional ones on a time-to-train as well as an operational cost basis. Experimental studies have demonstrated that the proper use of specialized cues can enhance actual flight performance despite the unavailability of such cues in the real world. O.C.

A83-17310#

**THE JA37 /VIGGEN/ PILOT TRAINING CONCEPTS ATD PRELIMINARY USE AND 'SIGNS' OF EFFECTIVENESS**

P. HAGLIND (Swedish Air Force, Stockholm, Sweden) In: Radio Technical Commission for Aeronautics, Technical Symposium and Annual Assembly Meeting, Washington, DC, November 18-20, 1981, Proceedings. Washington, DC, Radio Technical Commission for Aeronautics, 1982, p. 115-122.

The JA37 aircraft represents the fighter version of the 37 VIGGEN. It is a single seat, single engine fighter with a delta-shaped nose-wing placed in front of and above a delta-shaped main wing. This wing combination provides high top speed and very low landing speed. The aircraft is equipped with an integrated electronic system, including distributed digital processors and a central digital computer. The aircraft is armed with IR missiles, radar missiles, an automatic cannon, and air-to-surface rockets. The Aircraft Training Device System (ATD) is discussed along with the JA37 simulator, facilities for automatic measurement and evaluation of pilot performance, and details regarding simulator use. An on-board recorder system is used for obtaining information which is used later on the ground for debriefing/training purposes and for maintenance objectives. G.R.

A83-17574

**ASTRONAUTS FOR THE SHUTTLE**

C. PEEBLES Spaceflight, vol. 25, Jan. 1983, p. 20-23. refs

The selection process and requirements for the Shuttle astronauts are described. STS astronauts are divided into pilots and mission specialists. The 1978 and 1980 pilot applicants needed a BS degree in a physical science, engineering, or mathematics, and in 1980 a degree in biology alternative was added. Additionally, the prospective pilot needed a minimum of 1000 hr of pilot-in-command time, which in 1980 was defined as in jets. Physical qualifications included 20/50 visual acuity, hearing loss limited to 30 dB at 500 Hz and 25 dB at 1000 and 2000 Hz, a systolic BP no more than 140, and diastolic no more than 90 mm Hg. Height was in the range 64-76 in. Mission specialists need a BS in the same disciplines as pilots plus three years experience

or an advanced degree. Identical BP, lower visual acuity (20/100), one ear meeting pilot rating and the other allowed at 35 dB loss at 500 Hz and 30 dB loss at 1 and 2 kHz were acceptable. Height was restricted to 60-70 in. Pilot and specialist screening processes at Houston are outlined, noting the 40 hr duration of the selection procedures. Civilian who qualified are expected to serve 5 yr with NASA, while servicemen will stay for 7 yr. The candidate selections are carried out annually since 1980. M.S.K.

#### A83-17697

#### THE USE OF THE TRACKING REACTION DURING THE NORMALIZATION OF SEVERAL WORK-RELATED FACTORS [ISPOL'ZOVANIE REAKTSII SLEZHENIIA PRI NORMIROVANII NEKOTORYKH FACTOROV PROFESSIONAL'NOI DEIATEL'NOSTI]

E. K. BEREZHNAIA, A. V. ZAKHAROV, and A. M. PARACHEV  
Voenno-Meditsinskii Zhurnal, Nov. 1982, p. 39-41. In Russian. refs

The effects of the length of work activity, high temperature of the surrounding environment, and high-altitude factors on volunteer operators were examined utilizing parameters of the tracking reaction. It was found that the integral errors of the tracking reaction were sufficiently informative parameters for evaluating the fatigue of automobile drivers after extended periods (10 hr) of driving. Only slight changes in the work capacity of operators subjected to high temperature conditions (35 C) were observed, while the tracking parameter accurately reflected the effects of and the adaptation to high-altitude conditions. However, sharp decreases in the work capacity of operators during night in a trainer were detected using the tracking reaction. It is concluded that the tracking reaction is an informative criterion for evaluating the work capacity of operators. N.B.

#### A83-17958

#### AN INVESTIGATION OF MOTIVATIONAL FACTORS AMONG BASE-LEVEL AIR FORCE CIVIL ENGINEERS

H. A. RUMSEY (USAF, Washington, DC) and W. C. MOOR (Arizona State University, Tempe, AZ) Engineering Management International, vol. 1, Dec. 1982, p. 209-219. refs

An attempt to define the conditions required to encourage Air Force civil engineers to remain in the service and progress through management training is presented. Constraints on improving the conditions are noted to be lower-than-civilian pay scales, the willingness of marginal engineers to reenlist to take advantage of the 20-yr retirement terms, and the surveyed dissatisfaction with rank. A critical incident interview technique was employed with all 1844 engineers in the A.F. to determine if corrections could be made at the base level. The technique involved identification of subjective reactions to particular situations brought forth in the interview in which the officer felt motivated or demotivated about the job. Dissatisfaction was mostly keenly felt towards A.F. personnel and assignment policies, as well as the work assignments. Salary was not a daily concern, as were relations with the supervisor, but did have influence on the decision on whether or not to remain in the service. Elements of a training program for engineering managers, with particular emphasis of taking advantage of the dominating role of motivators, are discussed. M.S.K.

#### A83-18193

#### THE MOON ILLUSION REVISITED

J. H. IAVECCHIA (U.S. Naval Material Command, Naval Air Development Center, Warminster, PA), H. P. IAVECCHIA (Analytics, Inc., Willow Grove, PA), and S. N. ROSCOE (New Mexico State University, Las Cruces, NM) Aviation, Space, and Environmental Medicine, vol. 54, Jan. 1983, p. 39-46. refs  
(Contract F49620-77-C-0117)

In two experiments, the apparent size of a simulated horizon moon was measured as a function of the location of visible texture in the natural vistas against which it appeared. Size was found to increase as the visible scene extended farther into the distance and to decrease as the moon rose above the vista of surface texture. In the second experiment, the observers' eye

accommodation distances to various scenes were also measured with a laser optometer, and after appropriate transformations, size judgments were found to correlate 0.89 with measured accommodation values, thereby suggesting the hypothesis that the fabled moon illusion is mediated by the oculomotor adjustments of visual accommodation. (Author)

#### A83-18194\* Brandeis Univ., Waltham, Mass.

#### PERCEIVED ORIENTATION IN FREE-FALL DEPENDS ON VISUAL, POSTURAL, AND ARCHITECTURAL FACTORS

J. R. LACKNER (Brandeis University, Waltham, MA) and A. GRAYBIEL (U.S. Naval Aerospace Medical Center, Aerospace Medical Research Laboratory, Pensacola, FL) Aviation, Space, and Environmental Medicine, vol. 54, Jan. 1983, p. 47-51. refs  
(Contract NAS9-15147; NASA ORDER T-9140-E)

In orbital flight and in the free-fall phase of parabolic flight, feelings of inversion of self and spacecraft, or aircraft, are often experienced. It is shown here that perceived orientation in free-fall is dependent on the position of one's body in relation to the aircraft, the architectural features of the aircraft, and one's visual appreciation of the relative configurations of his body and the aircraft. Compelling changes in the apparent orientation of one's body and of the aircraft can be reliably and systematically induced by manipulating this relationship. Moreover, while free-floating in the absence of visual, touch, and pressure stimulation, all sense of orientation to the surroundings may be lost with only an awareness of the relative configuration of the body preserved. The absences of falling sensations during weightlessness points to the importance of visual and cognitive factors in eliciting such sensations. (Author)

#### A83-18332

#### THE DEVELOPMENT POTENTIALS AND LIMITS TO PSYCHOLOGICAL SCREENING OF AVIATION PERSONNEL [POSSIBILITES DE DEVELOPPEMENT ET LIMITES DE LA SELECTION PSYCHOLOGIQUE DU PERSONNEL NAVIGANT]

J. BREMOND (Service de Sante des Armees, Division de Psychologie, Lyons, France) and G. VERON (Service de Sante des Armees, Centre d'Etudes et de Recherches Psychologiques Air, Saint-Cyr-l'Ecole, Yvelines, France) Medecine Aeronautique et Spatiale, vol. 21, 3rd Quarter, 1982, p. 146-153. In French. refs

Efforts and success in forming a standardized routine for the determination of the psychological fitness for pilot candidates are discussed. Pilot aptitude has been quantified as the success at certain training programs, although the psychomotor, intellectual, and character requirements are currently satisfied during competition for admission to pilot school. Experimental tests have been devised to test overall numerical, spatial, verbal, and social adaptability. Initial results, after five years of study, indicate no augmentation in the predictive capacity afforded by the standard tests. Long term monitoring of pilots after testing, an expensive procedure, is noted to be necessary for effective verification of any proposed testing method. An added constraint is the requirement of allowing for personal idiosyncrasies. Various evaluations of motivational, psychophysiological, psychopathological, and personality traits of individuals are described. M.S.K.

#### A83-18333

#### NUMERICAL AND PSYCHOPATHOLOGICAL DATA BEARING UPON 700 CERTIFICATIONS OF CIVIL AVIATION FLIGHT PERSONNEL [DONNEES NUMERIQUES ET PSYCHOPATHOLOGIQUES PORTANT SUR 700 EXPERTISES DU PERSONNEL NAVIGANT DE L'AERONAUTIQUE CIVILE]

R. J. DIGO (Centre Principal d'Expertise Medicale du Personnel Navigant, Paris, France) Medecine Aeronautique et Spatiale, vol. 21, 3rd Quarter, 1982, p. 153-160. In French.

Psychopathological indications observed during tests of 700 civil aviation flight personnel, including pilots, mechanics, radio-navigators, stewards and hostesses, and private pilots are discussed. The data were gathered during routine oral and medical examinations, as well as self-reported illnesses. The incidence of

depressive states, airsickness, traumatic neuroses, personality disorders, and other psychological syndromes were quantified. Depressive states were found to be most common, especially among navigators. An attempt is made to group personality disorders peculiar to air personnel into two categories: astheno-characterological, the degrading of capabilities due to fatigue and/or overwork, and anxio-phobic, an ensemble of depressive symptoms characteristic of adaptation to the flight environment. The flight environment can be the cabin interior, including the passengers, or somatic reactions to flight. It is noted that the quality of training, motivations, and the continual upgrading of equipment is the best defense against the onset of debilitating psychopathological symptoms. M.S.K.

A83-18339

**CRITERIA FOR THE EVALUATION OF THE PHYSICAL APTITUDE - THEIR UTILIZATION FOR THE CLASSIFICATION OF SUBJECTS [CRITERES D'EVALUATION DE L'APTITUDE PHYSIQUE LEUR UTILISATION EN VUE D'UN CLASSEMENT DES SUJETS]**

C. BOUTELIER, B. VETTES, and M. LONCLE (Centre d'Essais en Vol, Laboratoire de Medecine Aerospatiale, Bretigny-sur-Orge, Essonne, France) *Medecine Aeronautique et Spatiale*, vol. 21, 3rd Quarter, 1982, p. 187-193. In French. refs

The tests results of 17 subjects who performed exercises to aid in establishing a set of criteria for French astronaut selection, i.e., the capability of working in a weightless environment, are reported. Trials were enacted with an ergometer set at different power levels, with repeated increases in successive sessions. Ventilatory and metabolic processes were monitored during the exercises. Suitable criteria involving energetics, ventilatory responses, and cardiovascular performance were established from the tests, using composite data from all the subjects. No suitable method was found for combining all the data, or for predicting the improvements expected in the subjects with regular exercise. M.S.K.

A83-18366

**THE EFFECT OF THE RADIATION FACTOR ON THE ACTIVITY OF OPERATORS [VLIYANIE RADIATIONNOGO FAKTORA NA OPERATORSKUII DEIATEL'NOST]**

B. I. DAVYDOV, V. V. ANTIPOV, and I. B. USHAKOV *Kosmicheskie Issledovaniia*, vol. 20, Nov.-Dec. 1982, p. 928-940. In Russian. refs

A review is presented of studies concerning radiation psychophysiology in order to evaluate the factors which affect the work capacity of spacecraft operators. The psychophysiological potentials of irradiated humans are evaluated based on data from clinical observations. Attention is concentrated on an analysis of the behavioral effects in irradiated monkeys during such tests as learning and the retention of discriminated habits, the transfer of habits to a new situation, delayed reactions, attention, the manipulation of objects, etc. The dose and temporal patterns of these effects according to the level of radiation are examined. It is concluded that the disruption of the operating activity of cosmonauts takes place only during very high radiation doses, which rarely occurs even during very prolonged space flights. N.B.

A83-18967

**THE CORTICAL EVOKED NEGATIVE WAVE AS A REFLECTION OF SELECTIVE ATTENTION [KORKOVAIA VYZVANNIAIA NEGATIVNAIA VOLNA KAK OTRAZHENIE SELEKTIVNOGO VNIMANIYA]**

A. M. IVANITSKII and V. B. STRELETS (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Obshchei i Sudebnoi Psikhatrii, Moscow, USSR) *Zhurnal Vysshei Nervnoi Deiatel'nosti* vol. 32, Sept.-Oct. 1982, p. 826-833. In Russian. refs

The neurophysical mechanisms of selective attention are studied in humans by analyzing the negative wave which is the difference between the amplitude of an evoked potential to a stimulus and its amplitude to a lesser stimulus. Results show that the negative wave consists of two components with a latency of

140 and 200 millisecc. The first peak is most pronounced in the analyzer projection zone and is probably a result of the selective activation of the cortex by the thalamocortical system. The second peak is characterized by a diffused distribution over the cortex, which is linked with the activation of the cortex by the mesencephalic reticular system. It is concluded that the first peak of the negative wave is connected with involuntary processes, while the second peak is linked with voluntary attention. N.B.

N83-14914# Wisconsin Univ., Madison. Motor Behavior Lab.

**CODING, ORGANIZATION AND FEEDBACK VARIABLES IN MOTOR SKILLS Final Report**

G. E. STELMACH Apr. 1982 517 p refs  
(Contract AF-AFOSR-3691-78; AF PROJ. 2313)  
(AD-A118575; REPT-10; AFOSR-82-0620TR) Avail: NTIS HC A22/MF A01 CSCL 05J

The major theoretical accomplishment of this research effort is the application of organizational concepts derived from control theory to models of motor control. Experimental results of this effort include: (1) a demonstration that there is genuine interactivity of two limbs under a number of bimanual conditions, (2) evidence that rapid error corrections are dependent on efference rather than on afferent input indicating the existence of internal feedback that monitors efferent commands, (3) descriptions of spatial orientations within egocentric space, and (4) specification of the role of organizational processes in motor learning and control. Author (GRA)

N83-14915# Perceptronics, Inc., Woodland Hills, Calif.

**MENTAL REPRESENTATION OF CIRCUIT DIAGRAMS: INDIVIDUAL DIFFERENCES IN STRUCTURAL KNOWLEDGE**

T. D. WICKENS, R. E. GEISELMAN, M. G. SAMET, and C. L. YELVINGTON Jun. 1982 54 p refs  
(Contract N00014-81-C-0590)  
(AD-A119171; PATR-1109-82-6) Avail: NTIS HC A04/MF A01 CSCL 05J

The knowledge of electronics technicians of electronic equipment, and how people operate in tasks that draw upon a complex spatial symbolic knowledge base is considered. A technician's knowledge base is postulated to consist of three types of related knowledge: (1) structural/functional knowledge, (2) prototypical knowledge, and (3) procedural knowledge. The first of these knowledge types, structural/functional knowledge, was studied in an experiment in which subjects were asked to reconstruct circuits and to partition circuits into components. Dramatic performance differences, in terms of errors and speed, were found between technicians of varying skill levels. However, any between group differences in the derived representations of the structural/functional knowledge base were dwarfed by individual differences in the patterns of reconstruction and partitioning performance. It is anticipated that more fundamental differences among technicians of varying skill levels lie in their respective procedural knowledge. The results of this research program should help in providing guidelines for training electronic technicians to better understand and troubleshoot complex equipment. GRA

N83-14916# Boston Univ., Mass. Center for Adaptive Systems.

**THE QUANTIZED GEOMETRY OF VISUAL SPACE: THE COHERENT COMPUTATION OF DEPTH, FORM AND LIGHTNESS, REVISED VERSION Interim Report**

S. GROSSBERG Aug. 1982 106 p refs  
(Contract AF-AFOSR-0148-82; NSF IST-80-00257; AF PROJ. 2313)  
(AD-A119240; AFOSR-82-0713TR) Avail: NTIS HC A06/MF A01 CSCL 05J

A theory is presented of how global visual interactions between depth, length lightness, and form percepts can occur. The theory suggests how quantized activity patterns which reflect these visual properties can coherently fill-in, or complete, visually ambiguous regions starting with visually informative data features. Phenomena such as the Cornsweet and Craik-O'Brien effects, phantoms and subjective contours, binocular brightness summation, the equidistance tendency, Emmert's law, allelotropia, multiple spatial

frequency scaling and edge detection, figure-ground completion, co-existence of depth and binocular rivalry, reflectance rivalry, Fechner's paradox, decrease of threshold contrast with increased number of cycles in a grating pattern, hysteresis, adaption level tuning, Weber law modulation, shift of sensitivity with background luminance, and the finite capacity of visual short term memory are discussed in terms of a small set of concepts and mechanisms. Limitations of alternative visual theories which depend on Fourier analysis, Laplacians, zero-crossings, and cooperative depth planes are described. Relationships between monocular and binocular processing of the same visual patterns are noted, and a shift in emphasis from edge and disparity computations towards the characterization of resonant activity-scaling correlations across multiple spatial scales is recommended. Author (GRA)

**N83-14917# Arizona State Univ., Tempe. Dept. of Psychology. PHYSIOLOGICAL AND DUAL TASK ASSESSMENT OF WORKLOAD DURING TRACKING AND SIMULATED FLIGHT Final Report**

E. LINDHOLM, C. CHEATHAM, and G. BUCKLAND Jan. 1981 78 p refs

(Contract F49620-79-C-0197; AF PROJ. 2313)

(AD-A119218; AFOSR-82-0714TR) Avail: NTIS HC A05/MF A01 CSDL 05J

A visuomotor task of moderate complexity (tracking) and one of high complexity (simulated aircraft carrier landing) were performed alone, then in combination with a tone discrimination task at two levels of difficulty in usual dual task fashion. Measures of autonomic nervous system activation (heart rate, skin conductance) and central nervous system information processing (event related potentials) were quantified continuously during performance of all tasks. The dual task results were typical, given that most subjects treated the tone discrimination task as 'secondary' (low priority): tone discrimination performance degraded when the tone mask was combined with the tracking task and degraded even more when the tone task was combined with the carrier landing task. While dual task methodology adequately described gross changes in workload, the physiological data permitted much more detailed interpretations and descriptions of training effects (practice), tone mask information processing, individual differences, and visuomotor task control parameters than was possible by analysis of secondary task performance. It is concluded that the physiological method has distinct advantages over the dual task method, due mostly to the nonintrusive nature and the greater detail of results afforded by the former method.

Author (GRA)

**N83-14918# Naval Aerospace Medical Research Lab., Pensacola, Fla.**

**MULTIPLEX CONTROLLER APTITUDE TEST AND OCCUPATIONAL KNOWLEDGE TEST: SELECTION TOOLS FOR AIR TRAFFIC CONTROLLERS**

M. G. LILIENTHAL and F. S. PETTYJOHN 15 Dec. 1981 116 p refs

(Contract DTFA01-80-Y-30528)

(AD-A118803; NAMRL-SR-82-1) Avail: NTIS HC A06/MF A01 CSDL 05I

The cost of training Air Traffic Control (ATC) personnel has risen rapidly. Attrition of students prior to completion of the training results in loss of invested funds as well as a delay in providing a fully qualified ATC specialist to the field for both military and civilian agencies. Improved selection and prediction tests for ATC personnel have been recognized as essential to decrease attrition rates. This study examined the selection utility of the Federal Aviation Administration (FAA) prototype ATC test battery. The test protocol consisted of the Multiplex Controller Aptitude Test (MCAT), a job simulation test; and the Occupational Knowledge Test (OKT), a job knowledge specific test. Two-thousand four-hundred ninety-nine FAA/ATC Academy trainees from the 1978 through 1980 period had taken two versions of the Multiplex Controller Aptitude Test (MCAT1) and MCAT2) and one version of the Occupational Knowledge Test (OKT). Test scores for 1,954 of these subjects were merged with information concerning their

sex, education, ATC experience, ATC option, and pass/fail status at the ATC Academy. Item analyses indicated the MCAT contained very difficult or very easy items in over 50 percent of the test questions. The OKT had acceptable levels of item difficulty at the 25 percent level. GRA

**N83-14919# Logicon, Inc., San Pedro, Calif. Tactical and Training Systems Div.**

**PROTOTYPE CONFIGURATION REPORT FOR AIR INTERCEPT CONTROLLER PROTOTYPE TRAINING SYSTEM Final Report, 28 Sep. 1978 - 11 Feb. 1980**

R. D. GRANBERRY, R. HALLEY, and M. R. KING Jul. 1982 57 p

(Contract N61339-78-C-0182)

(AD-A118750; REPT-8641-A00C; NAVTRAEQUIPC-78-C-0182-6)

Avail: NTIS HC A04/MF A01 CSDL 05I

This report delineates the design criteria and human engineering principles and practices to be applied in the design and general arrangements of the ACE Prototype Training System. The specifics for site preparation, detailed floor plans and environmental requirements will be developed in the Prototype Facilities Report to follow. Author (GRA)

**N83-14920# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.**

**COGNITIVE PERFORMANCE DURING LONG-DURATION VIBRATION**

R. W. SHOENBERGER and C. S. HARRIS Jul. 1982 14 p refs

(Contract AF PROJ. 7231)

(AD-A118612; AFAMRL-TR-81-57) Avail: NTIS HC A02/MF A01 CSDL 05J

To evaluate the effects of vibration exposure duration on cognitive performance, the performance of 16 subjects was measured on a Complex Counting Task (CCT) and a reading task during a three-hour exposure to each of two whole-body vibration conditions. Quasi-random vibrations with frequencies from 2.6 through 16 Hz were presented at two intensities, 0.164 R.M.S. Gz and 0.03 R.M.S. Gz. During each of the two three-hour sessions the subjects performed the reading task for the first 45 minutes of each hour, and the CCT for the last 15 minutes of each hour. Performance on the CCT showed no effect of exposure duration; however, the reading task did provide evidence of such an effect. For the reading task, the high-level vibration condition showed a relative decrement in the amount read that increased with exposure duration. During low-level vibration there was a significant increase in reading rate that did not occur during high-level vibration.

Author

**N83-14921# National Aerospace Lab., Amsterdam (Netherlands). Flight Div.**

**EXPERIMENTAL AND THEORETICAL ANALYSIS OF HUMAN MONITORING AND DECISION MAKING BEHAVIOR IN FAILURE DETECTION TASKS**

R. C. VANDEGRAAFT and P. H. WEWRINKE 11 May 1981 18 p refs Presented at 1st European Ann. Conf. on Human Decision Making and Manual Control, Delft, May 25-27, 1981 Revised

(NLR-MP-81032-U) Avail: NTIS HC A02/MF A01

An experimental program designed to validate a model of the human observer and decision maker, formulated in terms of linear estimation and classical sequential decision theory is described. The experiment included monitoring tasks in which the occurrence of ramp failures which were superimposed upon zero-mean stochastic Gaussian processes had to be detected. The independent variables were signal bandwidth, correlation among displays, number of displays, failure rate, failure type, and prior knowledge about failure type. The dependent variables were response times, display deviations at the moments of response, and false alarm rates. Heart rate, skin resistance, and eye point of regard were measured. Good overall agreement between the experimental results and the model predictions is found.

Author (ESA)



**N83-16014#** Army Intelligence and Threat Analysis Center, Arlington, Va.

**DYNAMICS OF CERTAIN PSYCHOPHYSIOLOGICAL INDICES UPON EXPOSURE TO CUMULATED CORIOLIS ACCELERATION**

V. I. BABIYAK, L. A. GLAZNIKOV, and V. A. MOZIN *In its Mil. Med. J.*, No. 7, 1982 (L-2129) p 65-69 1982 refs Transl. into ENGLISH from Voenno-Med. Zh. (Moscow), No. 7, Jul. 1982 Avail: NTIS HC A07/MF A01

The dynamics of psychophysiologic changes in persons with varying degrees of resistance to rocking were studied. An automation system for recording and statistically processing simple and complex sensimotor reactions before and after exposure to continuous cumulation of Coriolis acceleration (CCCA) was used.

Author

**N83-16036#** Harvard Univ., Cambridge, Mass. Dept. of Statistics.

**VARIABLES ON SCATTERPLOTS LOOK MORE HIGHLY CORRELATED WHEN THE SCALES ARE INCREASED**

W. S. CLEVELAND, P. DIACONIS, and R. MCGILL *Jan. 1982* 12 p

(Contract N00014-79-C-0512; NSF MCS-79-08685) (AD-A120740; PJH-12) Avail: NTIS HC A02/MF A01 CSCI 12A

Subjects were shown scatterplots and were asked to judge the amount of association between the two variables. Judged association increased when the scales on the horizontal and vertical axes were simultaneously increased so that the size of the point cloud within the frame of the plot decreased. Judges association was very different from the correlation coefficient,  $r$ , which is the most widely used measure of association.

Author (GRA)

## 54

### MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

**A83-16870**

**EVALUATION OF THE PERCEPTUAL ATTRIBUTES OF EMISSIVE AND NON-EMISSIVE DISPLAY DESIGNS USING COMPUTER SIMULATION**

J. LAYCOCK (Royal Aircraft Establishment, Farnborough, Hants., England) *Displays*, vol. 3, Oct. 1982, p. 193-196. refs

A technique is described which may allow the display designer to evaluate the viability of materials used in display designs. The power spectra of discrete components are numerically manipulated to calculate the power spectrum of the light reaching the human eye for chosen display and illumination configurations. The chromatic coefficients of the resultant power spectrum are calculated and passed through calibration software to permit the chromatic equivalent image to be reproduced on a trichromatic cathode ray tube. Alternative display configurations may be simulated simultaneously to allow visual comparisons to be made.

(Author)

**A83-16930**

**THE EFFECTS OF VARIATIONS IN GARMENT PROTECTION ON CLEAN ROOM CLEANLINESS LEVELS**

C. W. WEBER and J. M. WIECKOWSKI (Lockheed Missiles and Space Co., Inc., Sunnyvale, CA) *Journal of Environmental Sciences*, vol. 25, Nov.-Dec. 1982, p. 13-16. refs

With an increasing need for more stringent contamination controls within clean rooms, the selection of the best combination of protective garments and their duration of use to maintain a desired cleanliness level becomes highly significant. This study examines the changes in cleanliness levels for airborne and

surface-migrating particles as the use of garments varies from the maximum protection of coveralls, hoods, and boots to the minimum protection of Dacron smocks. Results of particle shedding by garments after periods of use from one to five days are also presented.

(Author)

**A83-17158**

**A NOMOGRAM FOR DETERMINING THE CONDITIONS OF THE STEP TEST [NOMOGRAMMA DLIA OPREDELENIYA USLOVIV STEP-TESTA]**

V. N. GEDRAZHKO and V. A. CHERNIAK (Odesskii Meditsinskii Institut, Odessa, Ukrainian SSR) *Vrachebnoe Delo*, Oct. 1982, p. 47, 48. In Russian.

A nomogram is presented for determining the conditions of the step test for any desired load in tests using a bicycle ergometer. A simple method is shown for selecting the corresponding conditions for the separate parameters in the step test.

N.B.

**A83-17169**

**A DEVICE CONTROLLING THE TIMING AND FREQUENCY OF PHYSICAL LOADS [USTROISTVO DLIA VREMENNOGO I TEMPOVOGO DOZIROVANIYA FIZICHESKIKH NAGRUZOK]**

T. V. KHUTIEV (Sanatorii imeni Fabritsiusa, Sochi, USSR) *Voprosy Kurortologii, Fizioterapii i Lechebnoi Fizicheskoi Kul'tury*, Sept.-Oct. 1982, p. 67, 68. In Russian.

**A83-17191**

**HYGIENIC EVALUATION OF CLOTHING MADE OF CHEMICAL FIBERS [GIGIENICHESKAIA OTSENKA ODEZHDI IZ KHIMICHESKIKH VOLOKON]**

K. A. RAPOPORT, S. F. IONKINA, and A. A. MINKH *Akademiia Meditsinskikh Nauk SSSR, Vestnik*, no. 10, 1982, p. 40-45. In Russian.

Experience related to the utilization of chemical fibers in clothing shows that a number of hygienic requirements are not satisfied by these materials. In particular, these fibers are characterized by a lack of chemical stability, water-repellent properties, electrifiability, bad thermal insulation properties, and an occurrence of maintenance problems. The most widely used fibers consist of polyamide, polyvinyl chloride, and polyacrylonitrile materials. A major source of toxic environmental pollutants are substances applied to the textiles with the objective to improve dimensional stability and properties related to resistance against burning, water repellency, and antistatic qualities. Attention is given to data concerning hygienic material parameters of different types of clothing.

G.R.

**A83-17195**

**THE ESTABLISHMENT OF SAFE LEVELS OF LOCAL VIBRATION [K VOPROSU OBOSNOVANIYA BEZOPASNOGO UROVNIA LOKAL'NOI VIBRATSII]**

G. A. SUVOROV, E. I. DENISOV, E. S. ZIATIKOV, and V. G. OVAKIMOV (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) *Gigiena Truda i Professional'nye Zabollevaniia*, Oct. 1982, p. 6-10. In Russian. refs

**A83-17201**

**AN INVESTIGATION OF THE SHIELDING EFFECTIVENESS OF FPP-15 FABRIC RELATIVE TO BACTERIAL AEROSOLS [ISSLEDOVANIIE ZASHCHITNOI EFFEKTIVNOSTI TKANI FPP-15 V OTNOSHENII BAKTERIAL'NOGO AEROZOLIA]**

V. S. BORTKEVICH, I. A. CHEREDNICHENKO, and A. G. MOROZ (Belorusskii Nauchno-Issledovatel'skii Institut Epidemiologii i Mikrobiologii, Minsk, Belorussian SSR) *Gigiena i Sanitariia*, Oct. 1982, p. 65, 66. In Russian. refs

A83-17203

**EXPERIMENTAL DATA FROM A STUDY OF THE TOXIC EFFECT ON EMBRYOS EXERTED BY HEXACHLOROPHENE - A COMPONENT OF ANTIMICROBIAL FABRICS AND SYNTHETIC ARTICLES OF EVERYDAY USE [EKSPERIMENTAL'NYE DANNYE PO IZUCHENIU EMBRIOTOKSICHESKOGO DEISTVIA GEKSAKHLOFENA - KOMPONENTA ANTIMIKROBNYKH TKANEI I BYTOVYKH KHIMICHESKIKH VESHCHESTV]**

K. A. RAPOPORT, T. A. MENSHIKOVA, and E. A. BOBKOVA (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Gigiena i Sanitariia, Oct. 1982, p. 26-29. In Russian. refs

A83-17250

**RADIO-FREQUENCY HAZARDS IN THE VLF TO MF BAND**

O. P. GANDHI and I. CHATTERJEE (Utah, University, Salt Lake City, UT) IEEE, Proceedings, vol. 70, Dec. 1982, p. 1462-1464. refs

(Contract F33615-78-D-0617)

The body currents induced in a human in conductive contact with various ungrounded metallic objects like cars, trucks, fences, etc., are calculated for the frequency band 10 kHz to 10 MHz. The calculated incident E-fields required to produce threshold perception and let-go currents indicate that the recently proposed ANSI guideline of 100 mW/sq cm (approximately 615 V/m) in the frequency band 0.3 to 3.0 MHz may result in a potential for RF burns. (Author)

A83-17732#

**HUMAN FACTORS OF FUTURE AIR TRAFFIC CONTROL SYSTEMS**

V. D. HOPKIN (RAF, Institute of Aviation Medicine, Farnborough, Hants., England) In: Air traffic management - Current problems and future concepts; Proceedings of the Spring Convention, London, England, May 12, 13, 1982. London, Royal Aeronautical Society, 1982, 9 p.

A more realistic perspective is called for in the appraisal of the effects of future air traffic control systems on their human operators. Operator stress has been found to be a less severe problem than originally thought, but no attention has been given to the potentially crucial problem of operator boredom, about the effects of which nothing is known. Similarly, efforts expended on the definition of adequate workload indices, which assumed a fixed, measurable mental capacity, might have been more fruitfully directed at determining the effects of insufficient involvement, low task loading and imposed inactivity on the efficiency and safety of air traffic control. These questions assume even greater importance in the future because of the prospective replacement of much current flight control equipment with novel designs which employ even more extensive automation of operator tasks. O.C.

**A83-18187\*** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

**A COMPARISON OF LIMB PLETHYSMOGRAPH SYSTEMS PROPOSED FOR USE ON THE SPACE SHUTTLE**

B. M. LEVITAN (NASA, Johnson Space Center, Physiological Performance Laboratory; Technology, Inc., Houston, TX), L. D. MONTGOMERY (NASA, Johnson Space Center, Physiological Performance Laboratory, Houston, TX; SRI International, Menlo Park, CA), P. K. BHAGAT (NASA, Johnson Space Center, Physiological Performance Laboratory, Houston, TX; Kentucky, University, Lexington, KY), and J. F. ZIEGLSCHMID (NASA, Johnson Space Center, Physiological Performance Laboratory, Houston, TX) Aviation, Space, and Environmental Medicine, vol. 54, Jan. 1983, p. 6-10. refs

(Contract NAS9-14880)

Comparisons of a Whitney mercury-filled double-stranded strain gauge with two plethysmographs proposed for Shuttle use - an ultrasound and an impedance plethysmograph - were performed on 20 subjects. An occlusive thigh pressure cuff, inflated to 50 mm Hg, caused partial venous occlusion and subsequent blood pooling distal to the cuff. The average maximum volume changes observed in the Whitney/ultrasound test were 2.07% and 3.35%,

respectively, and 2.12% and 2.53% for the Whitney/Impedance comparison. Applying the ratio of the maximum volume changes to the gain of each test system caused the impedance and ultrasound volume change determinations to be essentially identical to the Whitney gauge. The three different limb parameters measured result in significant magnitude differences but the three systems track their respective changes identically. (Author)

A83-18343

**DESIGN AND FABRICATION OF A PORTABLE DEVICE TO MEASURE THE RESPONSE TIME TO A LUMINOUS STIMULUS [CONCEPTION ET REALISATION D'UN APPAREIL PORTATIF DE MESURE DU TEMPS DE REPONSE A UN STIMULUS LUMINEUX]**

C. BOUTELIER, P. DEMENAY, and G. LEGRAND (Centre d'Essais en Vol, Laboratoire de Medecine Aerospatiale, Bretigny-sur-Orge, Essonne, France) Medecine Aeronautique et Spatiale, vol. 21, 3rd Quarter, 1982, p. 208-212. In French. Direction des Recherches, Etudes et Techniques

(Contract DRET-78/1207)

A portable response time measurement device has been devised for use in climate chambers, decompression chambers, vibrating chairs, centrifuges, etc. The apparatus is intended for use in short trials, wherein the sensorial organ is isolated, with simple responses being required. The involvement of higher processes of the brain must not be invoked for response, and the subject is to have no knowledge of the results during the tests. The device signals with a red-colored light, which the subject can extinguish with the push of a button. A block diagram of the circuitry is provided for the light-weight modular unit. Operational conditions are noted to comprise temperatures of -30 C. M.S.K.

A83-18344

**ELECTRONIC VISUALIZATIONS AND MEANS OF PROTECTION FOR THE VISUAL FUNCTION - A METHOD OF STUDY [VISUALISATIONS ELECTRONIQUES ET MOYENS DE PROTECTION DE LA FONCTION VISUELLE-METHODE D'ETUDE]**

J. P. MENU (Service de Sante des Armees, Paris, France) and G. SANTUCCI Medecine Aeronautique et Spatiale, vol. 21, 3rd Quarter, 1982, p. 212-216. In French.

A methodology for assaying the visibility of colors displayed by digital avionic CRTs is described, noting the basis in color vision experimentation. The experimentation described would measure the visual acuity in the face of contrasting colors, color identification in the presence of a uniform background, and the chromatic color differential. All the displays would be presented on a CRT. A scale of colorimetric points is detailed for measuring the relative degradation experienced when the subject is confronted with varying color fields. The effectiveness of different colors for symbol projection is discussed. Additional attention is recommended to the large data base already existing from inflight trials. M.S.K.

A83-18345

**SEPARATED MEASUREMENT OF GAS FLOWS THROUGH DIFFERENT COMPARTMENTS OF A PARTIALLY PRESSURIZED SUIT [MESURE SEPARÉE DES DÉBITS GAZEUX À TRAVERS LES DIFFÉRENTS COMPARTIMENTS D'UN VÊTEMENT À PRESSURISATION PARTIELLE]**

H. MAROTTE, H. VIELLEFOND (Service de Sante des Armees, Paris, France), and J. DEHAYES Medecine Aeronautique et Spatiale, vol. 21, 3rd Quarter, 1982, p. 217-219. In French.

Experimentation was carried out with 5 human subjects in a pressure chamber to measure the gas flow in different parts of a pressure suit. In simulated stratospheric conditions, meters were installed at the output of the regulator, at the entrance of the suit and another at the feed channels between suit parts. The gas flow was found to depend on the body shape of the subject, variations between tests on the same subject, the experimental conditions, and the altitude simulated. The suit was found to provide for altitudes slightly lower than those simulated. The results are considered significant for the design of new pressure suits which will feature gaseous mixtures instead of pure oxygen. M.S.K.



A83-18496#

**SYSTEM-THEORETICAL ANALYSIS OF THE TEMPORAL BUILDUP OF TRANSIENT PROCESSES IN THE VISUAL SYSTEM [SYSTEMTHEORIE ANALYSE DER ZEITLICHEN EINSCHWINGVORGAENGE IM VISUELLEN SYSTEM]**

U. LUPP Muenchen, Technische Universitaet, Fakultae fuer Elektrotechnik, Dr.-Ing. Dissertation, 1981. 106 p. In German. refs

The temporal characteristics of transmission in the visual system are studied. The present state of knowledge in the area is discussed, including the modeling of the transmission function, the influence of eye motion during lengthy stimulation, and the determination of the transmission function in the absence of eye movements. Reaction time difference measurements to determine the temporal transmission function of the visual canal during detection are presented, with a discussion of such subjects as reaction time as a function of local frequency and contrast, the significance of reaction time differences, and the distribution of reaction times. The experimental results are compared with those obtained elsewhere for the parameters of local frequency, average light intensity, impulse functions, and reaction time differences. The influence of a signal-dependent delay time is discussed.

C.D.

A83-18811#

**DESIGNING PATROL AIRCRAFT FOR THE CREW**

L. STANTON (Lockheed-California Co., Burbank, CA) Astronautics and Aeronautics, vol. 21, Jan. 1983, p. 38-42.

The advanced variant of the P-3 ASW patrol aircraft is equipped for in-flight refueling and will be able to patrol for 20 or more hours. The tactical crew will work at the position of least maneuvering motion, above the center of gravity, and in the quietest area. Avionics equipment noise will be reduced by acoustically enclosing and baffling the immediate areas around the transformer-rectifier units, and vibrationally isolating the units from their supports. The galley has been equipped with a sink, hot and cold water, a refrigerator, an oven, a coffeemaker, cooking utensils and a food storage space, along with an exhaust system that prevents the spread of cooking odors. Four bunks are provided for sleeping. Tasks have been apportioned to prevent operator overload, and tactical crews are grouped to prevent feelings of isolation, motivate crew members through team spirit, and improve crew stability.

O.C.

A83-18973

**AN INTEGRATED NOISEPROOF SYSTEM OF LEADS FOR RECORDING THE ECG, EMG, EEG, AND RESPIRATION OF AN OPERATOR [KOMPLEKSNAIA POMEKHOUSTOICHIVAIA SISTEМА DLIА OTVEDENIIА EKG, EMG, EEG I DYKHANIIА U CHELOVEKA-OPERATORА]**

V. V. GORBUNOV Zhurnal Vysshei Nervnoi Deiatel'nosti, vol. 32, Sept.-Oct. 1982, p. 991-995. In Russian. refs

A83-19613

**THE PERFORMANCE OF CONTAINMENT FACILITIES**

R. P. CLARK (Clinical Research Centre, Harrow, Middx., England) (Society of Environmental Engineers, Symposium and Exhibition on Environmental Engineering Today, London, England, July 13-15, 1982.) Society of Environmental Engineers, Journal, vol. 21-4, Dec. 1982, p. 31-35. refs

The suitability of techniques used in measuring the containment effectiveness of microbiological safety cabinets for assessing the containment performance of fume cupboards is explored. The similarities of the two structures are discussed in terms of the two testing methods employed with Class I safety cabinets, which have standardized contamination levels of 1 part in 100,000-1,000,000. The safety levels in fume cupboards holding carcinogenic or radiopharmaceutical materials can be the same as in Class I cabinets if filtration and venting are provided with equivalent equipment and efficiencies. However, fume cupboards have apertures an order of magnitude larger. Providing a negative atmosphere in the fume cupboard is projected to afford the operator with 6 parts in 1,000,000 protection. Tailoring the aerodynamic

performance of new fume cabinets to smooth the airflow and eliminate eddies and turbulence was tested experimentally. At inflow velocities of 0.63 m/sec and 0.35 m/sec, protection factors were one part in 49,000 and one part in 17,000, respectively.

D.H.K.

M83-14922 Stanford Univ., Calif.

**MOTION SEQUENCING OF MANIPULATORS Ph.D. Thesis**

M. S. MUJTABA 1982 306 p

Avail: Univ. Microfilms Order No. DA8220511

Experience in using manipulators was gained by programming the assembly of flashlights, lawn sprinklers and other objects using AL, an interactive programming language for robots. Analysis of the programs disclosed commonly repeated sequences of operations. Examination of industrial engineering techniques revealed that the Methods Time Measurement (MTM) system was an extensive body of knowledge for analyzing human motions while performing various tasks. Many sequences of operations in programming mechanical arms were found in MTM. Motion Sequencing of Manipulators (MSM) for describing and specifying operations for mechanical arms was proposed after analyzing mechanical assembly programs and studying MTM. The MSM procedure was implemented in AL and evaluated by various people familiar with industrial engineering and manipulator programming languages. They concluded that MSM is more succinct, simpler and has fewer commands than AL.

Dissert. Abstr.

N83-14923# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.

**EFFECTS OF NON-PREFERRED HAND ON CONTROL MOVEMENT STEREOTYPES M.S. Thesis - Texas A and M Univ.**

R. L. LENZ 1982 74 p refs

(AD-A118976; AFIT/CI/NR/82-32T) Avail: NTIS HC A04/MF A01 CSCL 05J

A laboratory study was conducted to establish the degree to which ON-OFF control movement stereotypes apply to the non-preferred hand as well as to the preferred hand and both hands acting in unison. The subjects were 120 Air Force ROTC students at Texas A&M University. Thirty of these subjects were left-handed. Twenty of the subjects performed under each of the six conditions with 5 left-handed in each group. A criterion score for stereotyped performance was set at 85 percent and Z-tests were conducted to establish significance. Data showed strong stereotypes for turning off switches, but showed no corresponding stereotypes for turning on switches. Left-right toggles showed no stereotype for either hand. Use of the non-preferred hand showed consistently lower percentages in the expected direction but the differences were not statistically significant. When both hands were used together, opposing movements predominated for left-right and rotary switches. Horizontally mounted toggle switches were pulled rearward for both on and off under all conditions.

GRA

N83-14924# Naval Ocean Systems Center, San Diego, Calif.

**WORK SYSTEMS PACKAGE AUTOMATIC TOOL INTERCHANGE. LABORATORY STUDY SHOWS THAT AUTOMATING CERTAIN WSP FUNCTIONS IS FEASIBLE Final Report, Oct. 1977 - Jun. 1978**

C. E. MORRIN 10 Jun. 1982 120 p refs

(AD-A119327; NOSC/TR-262) Avail: NTIS HC A06/MF A01 CSCL 13J

The Work Systems Package (WSP) is a remotely controlled manipulator with tools and support equipment, developed to interface with manned and unmanned undersea vehicles to perform ocean-floor salvage, recovery, installation, and repair tasks. Since bottom time is limited, risk factors are high, and visibility often is poor or hampered, automation of certain WSP functions would take advantage of the limited available power and reduce the risk factor. Automating the WSP via a computer program allows the WSP accessories (e.g., tool box and tools) to be moved out of the prime visibility area of a manned vehicle and helps the operator to perform tasks faster and more efficiently.

Author (GRA)

**N83-14925#** Cornell Univ., Ithaca, N. Y. Dept. of Computer Science.

**ON THE MOVEMENT OF ROBOT ARMS IN 2-DIMENSIONAL BOUNDED REGIONS**

J. E. HOPCROFT, D. A. JOSEPH, and S. H. WHITESIDES Mar. 1982 34 p refs  
(Contract N00014-76-C-0018; NSF MCS-81-01220)  
(AD-A119507; CU-CSD-TR-82-486) Avail: NTIS HC A03/MF A01 CSCL 12A

The classical mover's problem is the following: can a rigid object in 3-dimensional space be moved from one given position to another while avoiding obstacles? It is known that a more general version of this problem involving objects with movable joints is PSPACE complete, even for a simple tree-like structure moving in a 3-dimensional region. In this paper, we investigate a 2-dimensional mover's problem in which the object is a robot arm with an arbitrary number of joints. In particular, we give a polynomial time algorithm for moving an arm confined within a circle from one given configuration to another. We also give a polynomial time algorithm for moving the arm from its initial position to a position in which the end of the arm reaches a given point within the circle.

Author (GRA)

**N83-14926#** Navy Clothing and Textile Research Facility, Natick, Mass.

**THE LIQUID-AIR SYSTEM AND THE DRY-ICE COOLING SYSTEM: A FIELD TEST OF THE COOLING CAPABILITIES OF 2 LIFE-SUPPORT-SUIT ASSEMBLIES Final Report, Aug 1980 - Jul. 1981**

A. H. CHADWICK, J. C. SHAMPINE, R. A. KEENE, and J. W. GIBLO Jul. 1982 34 p  
(AD-A118650; NCTRF-144) Avail: NTIS HC A03/MF A01 CSCL 06K

The Navy Clothing and Textile Research Facility (NCTRF) conducted a field evaluation to compare two life-support-suit assemblies. One assembly was a liquid-air-cooled suit that provided convective cooling; the other was a dry-ice system that used liquid-cooled underwear to provide conductive cooling. The test results indicated the dry-ice system was preferred by 74.2% of the test subjects for cooling purposes.

Author (GRA)

**N83-14927#** Research Inst. of National Defence, Stockholm (Sweden).

**THE ROLE OF BIOTECHNOLOGY IN TECHNICAL SYSTEM DEVELOPMENT: SOME PROBLEMS [BIOTEKNOLOGIS ROLL VID TEKNISK SYSTEMUTVECKLING: NAAGRA PROBLEM]**

H. FURUSTIG Feb. 1982 59 p refs In SWEDISH  
(FOA-C-56029-H2) Avail: NTIS HC A04/MF A01

Problems related to the nature, development, and use of human factors engineering are considered and system development techniques are analyzed. The criterion question in human factors/biotechnology applications and information dissemination are discussed. Criteria are, e.g., applicability, credibility, communication feasibility. Human factors engineering considerations which are often underrated include ethical, design, and cultural preferences.

Author (ESA)

**N83-14928#** Centre Technique des Industries Mecaniques, Sentis (France).

**A TEST BENCH FOR TRACTOR SEATS Final Report [BANC D'ESSAI DE SIEGES DE TRACTEURS]**

J. P. DEVILLE Mar. 1982 73 p refs In FRENCH  
(CETIM-15-K-421) Avail: NTIS HC A04/MF A01

A test bench for tractor seats, a vibration generation system and signal analysis procedure which provide fast and economical quality evaluation were developed. A test bench design corresponding to European norms is described. The characteristics of the vibration simulator are discussed, showing that it must produce vertical and horizontal vibrations under electrohydraulic control with an amplitude of at least 7.5 cm at 2 Hz frequency. The implementation of the vibration system is described. The vibration is measured by two low frequency accelerometers and the resulting acceleration signals are weighted by a curve

representing the human tolerance to vibration. Computations are performed with the aid of an HP 5451 B computer.

Author (ESA)

**N83-16027\*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**LIFE SCIENCES EXPERIMENTS ON THE SPACE SHUTTLE R. D. JOHNSON In its Space Gerontology p 75-79 Nov. 1982**

Avail: NTIS HC A06/MF A01 CSCL 05H

The facilities afforded by the space shuttle/Spacelab to conduct life science experiments are described. Laboratory arrangement, specimen holding, and instrumentation are discussed.

M.G.

**N83-16037\*#** Ohio State Univ., Columbus. Industrial and Systems Engineering.

**USE OF COMPUTER-AIDED TESTING IN THE INVESTIGATION OF PILOT RESPONSE TO CRITICAL IN-FLIGHT EVENTS, VOLUME 1 Final Report, 1 Apr. 1981 - 30 Sep. 1982**

T. H. ROCKWELL and W. C. GIFFIN 30 Dec. 1982 160 p refs 2 Vol.

(Contract NAG2-112)

(NASA-CR-169720; NAS 1.26:169720) Avail: NTIS HC A08/MF A01 CSCL 05H

Development of computer aided formats, results of computer aided testing, learning in computer aided testing of critical in-flight event (CIFE) diagnosis and computer aided prompting are considered.

N.W.

**N83-16038\*#** Ohio State Univ., Columbus. Industrial and Systems Engineering.

**USE OF COMPUTER-AIDED TESTING IN THE INVESTIGATION OF PILOT RESPONSE TO CRITICAL IN-FLIGHT EVENTS. VOLUME 2: APPENDIX Final Report, 1 Apr. 1981 - 30 Sep. 1982**

T. H. ROCKWELL and W. C. GIFFIN 30 Dec. 1982 142 p 2 Vol.

(Contract NAS2-112)

(NASA-CR-169721; NAS 1.26:169721) Avail: NTIS HC A07/MF A01 CSCL 05H

Computer displays using PLATO are illustrated. Diagnostic scenarios are described. A sample of subject data is presented. Destination diversion displays, a combined destination, diversion scenario, and critical in-flight event (CIFE) data collection/subject testing system are presented.

Author

**N83-16039\*#** California Univ., Davis. Plant Growth Lab.

**UTILIZATION OF UREA, AMMONIA, NITRITE, AND NITRATE BY CROP PLANTS IN A CONTROLLED ECOLOGICAL LIFE SUPPORT SYSTEM (CELSS)**

R. C. HUFFAKER, D. W. RAINS, and C. O. QUALSET Oct. 1982 50 p refs

(Contract NCC2-99)

(NASA-CR-166417; NAS 1.26:166417; CELSS-21) Avail: NTIS HC A03/MF A01 CSCL 06K

The utilization of nitrogen compounds by crop plants is studied. The selection of crop varieties for efficient production using urea, ammonia, nitrite, and nitrate, and the assimilation of mixed nitrogen sources by cereal leaves and roots are discussed.

S.L.

**N83-16040\*#** Boeing Aerospace Co., Seattle, Wash.

**CONTROLLED ECOLOGICAL LIFE SUPPORT SYSTEM: TRANSPORTATION ANALYSIS Final Report**

E. GUSTAN and T. VINOPAL Nov. 1982 126 p refs

(Contract NAS2-11148)

(NASA-CR-166420; NAS 1.26:166420; CELSS-22) Avail: NTIS HC A07/MF A01 CSCL 06K

This report discusses a study utilizing a systems analysis approach to determine which NASA missions would benefit from controlled ecological life support system (CELSS) technology. The study focuses on manned missions selected from NASA planning forecasts covering the next half century. Comparison of various life support scenarios for the selected missions and characteristics

of projected transportation systems provided data for cost evaluations. This approach identified missions that derived benefits from a CELSS, showed the magnitude of the potential cost savings, and indicated which system or combination of systems would apply. This report outlines the analytical approach used in the evaluation, describes the missions and systems considered, and sets forth the benefits derived from CELSS when applicable. Author

**N83-16041#** ILC Dover, Frederica, Del. Protective Equipment Div.  
**IMPROVED VISOR MATERIAL FOR DPE OUTERGARMENT Final Report, 7 Jul. 1980 - 22 Jan. 1982**  
 R. ALEGRA 22 Jan. 1982 62 p  
 (Contract DAAK11-79-C-0066)  
 (AD-A120066) Avail: NTIS HC A04/MF A01 CSCL 111

This task was authorized to investigate alternative materials for the current PVC visor of the DPE Outergarment that will increase the shelf life of Outergarment without affecting its protective capability. A material search and test program isolated an Ionomer (Surlyn) as the improved material for the visor, and a functional test program verified the suitability of Surlyn as the visor material in the DPE Outergarment. Author (GRA)

**N83-16042#** Carnegie-Mellon Univ., Pittsburgh, Pa. Robotics Inst.  
**DYNAMICALLY STABLE LEGGED LOCOMOTION Technical Report, 1 Dec. 1980 - 30 Sep. 1981**  
 M. H. RAIBERT, H. B. BROWN, JR., M. CHEPPONIS, E. HASTINGS, and S. E. SHREVE 30 Nov. 1981 75 p refs  
 (Contract MDA903-81-C-0130; ARPA ORDER 4148)  
 (AD-A120692; CMU-RI-TR-81-9) Avail: NTIS HC A04/MF A01 CSCL 06D

Though vehicles that use legs for locomotion promise superior mobility and versatility, very little is known about their design and control. Balance, resonance, and dynamic control are key issues underlying high performance legged systems, both man-made and biological, yet understanding in these areas is particularly lacking. We focus attention on these important problems by studying hopping systems that have only one leg. A one-legged system must hop to locomote, must balance to hop, and must be dynamically controlled at all times to balance. An ideal one-legged planar hopping machine is presented with its equations of motion. Control is decomposed into a vertical hopping part and a horizontal balance part. A total vertical energy measure is used to control uniformity of hopping height when there are mechanical losses and irregular terrains. Balance and control of horizontal translation are explored through implementation of three controllers: a linear feedback controller, a stance controller, and a new table look-up controller. The design and operation of a physical planar hopping machine is discussed, along with preliminary experimental results for vertical control. Three new designs for experimental vehicles that operate in 3-space are presented. Two are mechanically simple designs with functional symmetry; the third is preliminary concept for a multi-legged balancing vehicle that is optimized for forward motion. Author (GRA)

**N83-16043#** Georgia Inst. of Tech., Atlanta. Production and Distribution Research Center.  
**IRG (INTERACTIVE ROUTE GENERATOR): A NARRATIVE DESCRIPTION**  
 F. H. CULLEN, J. J. JARVIS, and H. D. RATLIFF Feb. 1982 30 p refs  
 (Contract N00014-80-K-0709)  
 (AD-A120741; PDRC-82-15) Avail: NTIS HC A03/MF A01 CSCL 09B

The IRG system can be described in two general environments; a physical environment, which is mainly concerned with what components are where; and the philosophical environment, which is principally concerned with methodological issues such as division of labor between the man and the machine and the underlying mathematical models. We will begin this section with a brief discussion of the philosophical environment with the intent of

motivating the ensuing discussion of the system's physical components. GRA

**N83-16044#** Naval Submarine Medical Center, Groton, Conn.  
**CONTRAST SENSITIVITY MEASURED IN LOW LEVELS OF RED, WHITE, AND BLUE AMBIENT ILLUMINATION Interim Report**  
 D. F. NERI and J. A. S. KINNEY 19 Aug. 1982 16 p refs  
 (Contract MO100PN001)  
 (AD-A119920; NSMRL-989) Avail: NTIS HC A02/MF A01 CSCL 05E

Average contrast sensitivity functions were determined for six observers in the dark and under three colors of dim, ambient illumination. Measurements were taken with two different CRT screen brightnesses. The color of the illuminant did not affect the shape of these functions, or change sensitivity relative to a dark background. But the shape of the functions was changed by the screen luminance, consistent with other data in the literature. The frequent preference in submarine sonar shacks to blue light, over the customary red, is, therefore, due to factors other than enhanced contrast of the visual displays. GRA

**N83-16045#** Technion - Israel Inst. of Tech., Haifa. Center of Human Engineering and Industrial Safety Research.  
**ATTENTION CONTROL IN COMPLEX INFORMATION PROCESSING TASKS Final Report**  
 D. GOPHER and G. SPITZ Jul. 1982 26 p refs  
 (Contract AF-AFOSR-0069-82; AF PROJ. 2313)  
 (AD-A120402; HEIS-8207; AFOSR-82-0845TR) Avail: NTIS HC A03/MF A01 CSCL 05H

Results of this research can be summarized by stating that, under normal conditions, human operators are able to actively control their resource allocation. However, in the absence of feedback and proper instruction, the strategies which operators develop are often suboptimal. Moreover, time-sharing performance appears to be quite rigid and lacks the flexibility to respond efficiently to fluctuations in the requirements of the situation. Author (GRA)

**N83-16046#** National Academy of Sciences - National Research Council, Washington, D. C. Assembly of Mathematical and Physical Sciences.  
**AGING AND THE GEOCHEMICAL ENVIRONMENT**  
 1981 154 p refs  
 (Contract DE-AT01-79EV-93015)  
 (DE82-001319; DOE/EV-93015/1) Avail: NTIS HC A08/MF A01

The aging process and related environmental aspects that provide useful insight toward postponing some of the inevitable effects of aging were assessed. The awareness of biomedical and geochemical research scientists, decision makers in related areas, and the lay public interested in an understanding of the relation of the geochemical environment to senescence. GRA

**N83-16047#** Pennsylvania State Univ., University Park. Biomechanics Lab.  
**A MATHEMATICAL MODEL OF THE INERTIAL PROPERTIES OF A CARRIER-BACKPACK SYSTEM, VOLUME 4 Final Report, 1 Oct. 1979 - 31 Aug. 1981**  
 P. E. MARTIN, R. N. HINRICHS, I. S. SHIN, and R. C. NELSON May 1982 84 p refs  
 (Contract DAAK60-79-C-0131; DA PROJ. 1L1-62723-AH-98)  
 (AD-A120163; NATICK/TR-82/022-VOL-4; NATICK/IPL-252-VOL-4) Avail: NTIS HC A05/MF A01 CSCL 06C

This is a report on the development of a mathematical model and FORTRAN program to examine the inertial properties of a human backpack system. A 12 segment model was formulated to represent a soldier carrying a backpack and other objects often carried during military operations. This computer model is often used to generate values of the following variables: system mass, system center of mass location, system inertia tensor, and principal moments of inertia for the system. The model can be used to simulate both a male and female human body. Any one of four

backpack systems, each containing a 20 lb load, can be examined. Three of the backpacks have external frames and one has an internal frame. One or two loads, the weights of which are determined by the program user can be added to the 20 lb pack load. The positioning of these added loads is also user determined. In this report, the development of the model is discussed and results of executions of the program are presented. In addition, the report contains a listing of the FORTRAN program.

Author (GRA)

## 55

### PLANETARY BIOLOGY

Includes exobiology; and extraterrestrial life.

#### A83-17987

#### THE ABIOTIC SYNTHESIS OF AMINO ACIDS UNDER CONDITIONS IMITATING AN ASH-GAS CLOUD DURING VOLCANIC ERUPTIONS [ABIOGENNYI SINTEZ AMINOKISLOT V USLOVIAKH, IMITIRUIUSHCHIKH PEPLOVO-GAZOVUIU TUCHU PRI IZVERZHENII VULKANOV]

G. A. LAVRENT'EV, T. F. STRIGUNOVA, L. I. RAKITIN, L. A. PISKUNOVA, and I. A. EGOROV (Akademiia Nauk SSSR, Institut Biokhimii, Moscow, USSR) Akademiia Nauk SSSR, Doklady, vol. 267, no. 3, 1982, p. 756-759. In Russian. refs

The possibility of the abiotic synthesis of amino acids under conditions as close as possible to those in an ash-gas cloud during volcanic eruptions is investigated in order to examine the synthesis of simple organic compounds in conditions similar to those existing early in the history of the earth. A mixture containing water vapor, nitrogen, carbon dioxide, and ammonia, which corresponds to the composition of gases in a present-day volcano, is utilized for the reactions. The mixture is catalyzed by an analog to the ash formed by a present-day volcano, and it is heated at 430 C for 8 hr. Results show that the rate of synthesis for all amino acids is significantly higher (by 2-10 times) in the presence of ash than in its absence. The majority of the amino acids are formed in the condensate, the small particles of the condensing phase which are spread by the wind over large distances. It is concluded that ash-gas clouds are the most likely sources for the distribution of simple organic compounds over the face of the prebiotic earth.

N.B.

#### A83-18247\* University of Southern California, Los Angeles. OXIDATIVE PEPTIDE /AND AMIDE/ FORMATION FROM SCHIFF BASE COMPLEXES

B. L. STREHLER, M. P. LI (Southern California, University, Los Angeles, CA), K. MARTIN (California, University, San Diego, CA), H. FLISS (Case Western Reserve University, Cleveland, OH), and P. SCHMID Journal of Molecular Evolution, vol. 19, Dec. 1982, p. 1-8. refs (Contract NSG-7376)

One hypothesis of the origin of pre-modern forms of life is that the original replicating molecules were specific polypeptides which acted as templates for the assembly of poly-Schiff bases complementary to the template, and that these polymers were then oxidized to peptide linkages, probably by photo-produced oxidants. A double cycle of such anti-parallel complementary replication would yield the original peptide polymer. If this model were valid, the Schiff base between an N-acyl alpha amino aldehyde and an amino acid should yield a dipeptide in aqueous solution in the presence of an appropriate oxidant. In the present study it is shown that the substituted dipeptide, N-acetyl-tyrosyl-tyrosine, is produced in high yield in aqueous solution at pH 9 through the action of H<sub>2</sub>O<sub>2</sub> on the Schiff-base complex between N-acetyl-tyrosinal and tyrosine and that a great variety of N-acyl amino acids are formed from amino acids and aliphatic aldehydes under similar conditions.

(Author)

A83-18249\* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

#### THE POSSIBLE ROLE OF SOLUBLE SALTS IN CHEMICAL EVOLUTION

N. LAHAV and S. CHANG (NASA, Ames Research Center, Extraterrestrial Research Div., Moffett Field, CA) Journal of Molecular Evolution, vol. 19, Dec. 1982, p. 36-46. refs

A model for a prebiotic environment in which concentration, condensation, and chemical evolution of biomolecules could have occurred is proposed. The principal reactions expected of proteins, nucleic acids, lipids, and some of their precursors in this environment are discussed. The model is based on the concept of a fluctuating system in which hydration and dehydration processes occur in a cyclic manner, with allowance for high concentrations of soluble salts, such as chlorides and sulfates. It is concluded that the proposed prebiotic environment with its dynamical characteristics is a plausible model for the chemical evolution from monomers through random oligomers toward self-replicating chemical systems.

B.J.

#### A83-18250

#### STAGES OF EMERGING LIFE - FIVE PRINCIPLES OF EARLY ORGANIZATION

M. EIGEN (Max-Planck-Institut fuer biophysikalische Chemie, Goettingen, West Germany) and P. SCHUSTER (Wien, Universitaet, Vienna, Austria) Journal of Molecular Evolution, vol. 19, Dec. 1982, p. 47-61. Research supported by the Fonds zur Foerderung der Wissenschaftlichen Forschung refs (Contract FFWF PROJECT 3502; FFWF PROJECT 4506)

It is suggested that the evolution of the genetic language is based on five principles: (1) the formation of stereoregular heteropolymers; (2) selection through self-replication; (3) the evolution of quasi-species toward optimal structures; (4) regulated cooperation between competitors through catalytic hypercycles; and (5) the evaluation of translation products through compartmentalization. These principles are discussed in detail, and illustrated by experimental results.

B.J.

#### A83-19401

#### VOYAGER MISSION: IMPLICATIONS FOR PLANETARY BIOLOGY; PROCEEDINGS OF THE SIXTH ANNUAL COLLOQUIUM ON CHEMICAL EVOLUTION, UNIVERSITY OF MARYLAND, COLLEGE PARK, MD, OCTOBER 4-6, 1981

C. PONNAMPERUMA, (ED.) (Maryland, University, College Park, MD) Origins of Life, vol. 12, Sept. 1982. 95 p.

Results of investigations of the origin of life utilizing data provided by the Voyager mission are presented. Topics discussed include atmospheres and planetology, such as the chemical evolution in the Jupiter and Saturn Systems; organic chemistry, such as organic synthesis in the atmosphere of Titan and criteria for the emergence and evolution of life in the Solar System; and implications of the Voyager mission for extraterrestrial life, such as the formation of amino acids from models of Titan and more oxidized atmospheres. In addition, selected references concerning the Voyager mission and the origin of life are presented in a bibliographic article, which includes laboratory simulation and modelling studies of the Jovian atmospheres.

N.B.

A83-19402\* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

#### THE PREBIOLOGICAL PALEOATMOSPHERE - STABILITY AND COMPOSITION

J. S. LEVINE, T. R. AUGUSTSSON (NASA, Langley Research Center, Atmospheric Sciences Div., Hampton, VA), and M. NATARAJAN (Systems and Applied Sciences Corp., Hampton, VA) Origins of Life, vol. 12, Sept. 1982, p. 245-259. refs

In the past, it was generally assumed that the early atmosphere of the earth contained appreciable quantities of methane (CH<sub>4</sub>) and ammonia (NH<sub>3</sub>). This was the type of atmosphere believed to be the most suitable environment for chemical evolution, the nonbiological formation of complex organic molecules, the precursors of living systems. Photochemical considerations suggest that a CH<sub>4</sub>-NH<sub>3</sub> dominated early atmosphere was probably very

short-lived, if it ever existed at all. Instead, an early atmosphere of carbon dioxide (CO<sub>2</sub>) and nitrogen (N<sub>2</sub>) is favored by photochemical as well as geological and geochemical considerations. Photochemical calculations also indicate that the total oxygen column density of the prebiological paleoatmosphere did not exceed 10 to the -7th of the present atmospheric level.

(Author)

**A83-19403\*** Rensselaer Polytechnic Inst., Troy, N. Y.  
**PHOTOCHEMISTRY OF NH<sub>3</sub>, CH<sub>4</sub> AND PH<sub>3</sub> - POSSIBLE APPLICATIONS TO THE JOVIAN PLANETS**

J. P. FERRIS, J. Y. MORIMOTO, R. BENSON, and A. BOSSARD (Rensselaer Polytechnic Institute, Troy, NY) *Origins of Life*, vol. 12, Sept. 1982, p. 261-265. refs  
 (Contract NGR-33-018-148)

It is found that the photolysis of NH<sub>4</sub> at 185 nm in the presence of a two-fold excess of CH<sub>4</sub> results in the loss of about 0.25 mole of CH<sub>4</sub> per mole of NH<sub>3</sub> decomposed. The loss is shown to arise from the abstraction of hydrogen atoms from CH<sub>4</sub> by photolytically generated hot hydrogen atoms. It is concluded that NH<sub>3</sub> photolysis in the H<sub>2</sub>-abundant atmosphere of Jupiter is not responsible for the presence of the carbon compounds observed there, such as ethane, acetylene, and hydrogen cyanide, but may have had a role in the early atmosphere of Titan. Also, it is found that the photolysis of PH<sub>3</sub> with a 206 nm light source gives P<sub>2</sub>H<sub>4</sub>, which in turn is converted to a red-brown solid. The course of the photolysis is not changed appreciably when the temperature is lowered to 157 K except that the concentration of P<sub>2</sub>H<sub>4</sub> increases, while the presence of H<sub>2</sub> has no effect on the P<sub>2</sub>H<sub>4</sub> yield. Photolysis of 9:1 NH<sub>3</sub>:PH<sub>3</sub> is found to give a rate of decomposition of PH<sub>3</sub> that is comparable with that observed by the direct photolysis of PH<sub>3</sub> and comparable amounts of the red-brown solid and P<sub>2</sub>H<sub>4</sub> are observed. In addition, the implications of these results for the structures of the compounds responsible for the wide array of colors observed in the atmosphere of Jupiter are examined.

N.B.

**A83-19404**  
**ORGANIC SYNTHESIS FROM CH<sub>4</sub>-N<sub>2</sub> ATMOSPHERES - IMPLICATIONS FOR TITAN**

F. RAULIN, D. MOUREY, and G. TOUPANCE (Paris XII, Université, Creteil, Val-de-Marne, France) *Origins of Life*, vol. 12, Sept. 1982, p. 267-279. Centre National de la Recherche Scientifique refs  
 (Contract CNRS-ATP-3754)

Results of experimental investigations on organic synthesis from CH<sub>4</sub>-N<sub>2</sub> atmospheres are reviewed. Also, recent results in which hydrogen escape is simulated are examined, and the possible application of these findings to Titan are discussed. Topics examined include simulation experiments using UV light, high energy electrons and protons, and electrical discharges as energy sources. The influence of H<sub>2</sub> escape on the chemical evolution of the atmosphere and on the nature and relative quantities of organic compounds is studied in detail. The implications of these results for the organic chemistry at the periphery of Titan are examined.

N.B.

**A83-19405**  
**HETEROPOLYPEPTIDES ON TITAN**

C. N. MATTHEWS (Illinois, University, Chicago, IL) *Origins of Life*, vol. 12, Sept. 1982, p. 281-283. refs

Since hydrogen cyanide is a component of Titan's hazy atmosphere, HCN polymers might also be present by way of a low energy pathway leading initially to the synthesis of polyaminomalonnitrile. Subsequent reactions of HCN with the activated nitrile groups of this HCN homopolymer would then yield heteropolyamides, readily converted to heteropolypeptides following contact with frozen water on the surface of Titan. Similar HCN polymers in the reducing atmospheres of Jupiter and Saturn could be major contributors to the yellow-brown-orange appearance of these giant planets. Any detection of such HCN chemistry by the Voyager missions or the pending Galileo probe would constitute evidence for the hypothesis that heteropolypeptides on the primitive

earth were synthesized directly from hydrogen cyanide and water without the intervening formation of alpha-amino acids. (Author)

**A83-19406\*** Houston Univ., Tex.  
**CRITERIA FOR THE EMERGENCE AND EVOLUTION OF LIFE IN THE SOLAR SYSTEM**

J. ORO, K. REWERS, and D. ODOM (Houston, University, Houston, TX) *Origins of Life*, vol. 12, Sept. 1982, p. 285-305. refs  
 (Contract NGR-44-005-002)

It is proposed that there are at least 25 specific conditions or requirements which have to be fulfilled in order for life to appear and evolve in a planetary system such as ours. The criteria are grouped into five major general areas: (1) Planetary criteria relate to the physical properties of the planet as it is formed and as it becomes a cosmic body with the potential to provide an abode for life. (2) Chemical criteria concern the composition, availability of effective energy sources, and chemical constraints of the environment where reactions take place for the prebiological formation of biochemical compounds. (3) Protobiological criteria relate to the prebiologically synthesized oligomeric and polymeric biomolecules, how they interact cooperatively to form protobiological structures and functions, and self-assemble to give rise to a living system. (4) Evolutionary criteria are concerned with the processes responsible for the increase in complexity of organisms by genomic multiplication, symbiotic integration, and cellular differentiation, as well as with the negentropic ability of organisms to continuously recycle all the volatile biogenic elements. (5) Stellar criteria relate to the elemental composition mass, lifetime, and other features of Main Sequence stars which may be surrounded by planetary systems similar to our own.

N.B.

**A83-19407**  
**FORMATION OF AMINO ACIDS FROM MODELS OF TITAN AND MORE OXIDIZED ATMOSPHERES**

M. ISHIGAMI, M. KINJO, K. NAGANO (Jichi Medical School, Minamikawachi, Tochigi, Japan), and Y. HATTORI (Kanagawa, University, Yokohama, Japan) *Origins of Life*, vol. 12, Sept. 1982, p. 307-310.

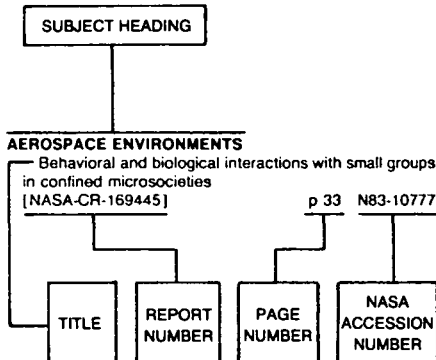
Protein and non-protein amino acids were synthesized following hydrolysis of products obtained by high frequency discharge techniques applied to model atmospheres consisting of N<sub>2</sub> as a nitrogen source together with CH<sub>4</sub> and/or CO<sub>2</sub> as a carbon source. Highest yields were obtained in the absence of CO<sub>2</sub> and from mixtures rich in CH<sub>4</sub>. Amino acids would indeed be expected on the frozen surface of Titan with its CH<sub>4</sub>-N<sub>2</sub> atmosphere.

(Author)

**A83-19409\*** George Washington Univ. Medical Center, Washington, D.C.  
**THE VOYAGER MISSION AND THE ORIGIN OF LIFE - SELECTED REFERENCES**

L. G. PLEASANT (George Washington University Medical Center, Washington, DC) *Origins of Life*, vol. 12, Sept. 1982, p. 321-329. refs  
 (Contract NASW-3165)

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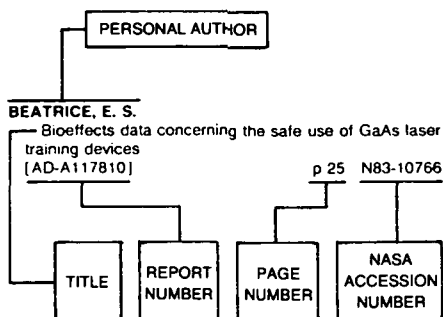
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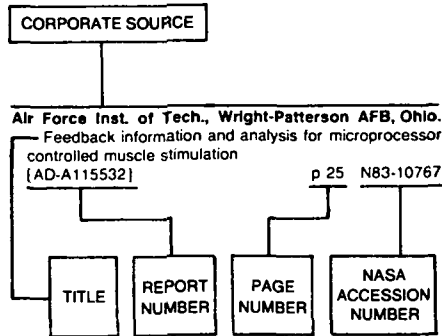
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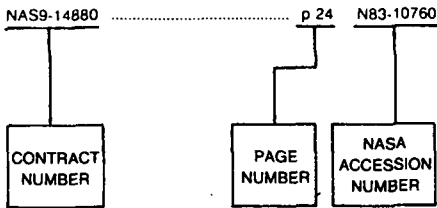
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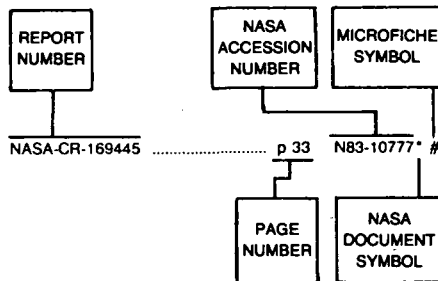
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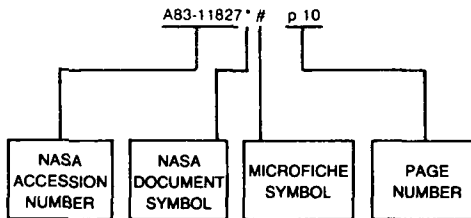
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